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All Books Revised Every Two Years

HANDBOOK
of
MEDICAL TREATMENT

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Chapter 1

GENERAL ASPECTS OF MEDICAL TREATMENT

Succes ful medi al tr atm t include consideration of all the va ious m a or s for achi vi g nd mai tai i g the optim l ph sical and m t l st tus of the p ti t duri g th ours of his illn s The physi ian mu t onsid the following g n r l and specific m sur s in formul ting a ther p ic gim

1 Activity st tus and bed position P g s 1 and 2
2 F ircmm rt (including home manag ment) P g 2
3 Clinical obs rv tions P ge 8
4 Labo tory studies Page 8
5 Fl ids P g s 8 and 10
6 Symptomatic and supportive m s r s Page 30
7 Diet Page 44
8 Spe ific m res Se Spe ific Di e e

ACTIVITY STATUS

Bed r st has long be and will onti ue to be a basic t eat ment m thod for m y illness s It is however not without its dis dvantages or ven its dang

The deg of a tivity permitt d a pati nt should be ba ed upon a ar ful onsid ation of the patient s physiologi al ne ds for ti vity or t In gener l a tivity hould be less than that whi h int f s with he li g proc s s or induc s respirat ry d tre or other unde ir bl symptom (g e essiv f tigue) On the othe hand, acti ity should not be limited to s h a e tent th t dis advant g ous phy i l gi l or psychologic l result e

Type of Activity St t

A Ambul tory F ll patie t unl ss th r re spe ific cont ind tion (see below)

B Bed Re t With B th oom P i il ge For thos p ti ts in whom f ll mb lato y t tus p od s untowa d eff ts

C Bed R t Without Bath oom Privil g F most p ti ts with
 1 Cont g ous d
 2 A t f vers of moderate to evere degr e
 3 Moder te to ma ked dyspn from most cau
 4 Loc l inf ctions and infl mmation (g ll litis phl biti et) espe i lly of the lower ext miti s

D Compl t Bed R t Th e p ti nt r quir f dom f om phy l tion and r lief from motional stress or e cit ment They must have assist nc in eating changi g body position and u ing the bedp n Compl t bed t is r com mend d fo pati nt with

[illegible]

[illegible] which bed rest may be employed [illegible] [illegible] sequen[illegible] [illegible]

A [illegible]
   1 [illegible]
   2 [illegible]
   3 [illegible]
   4 [illegible]
   5 [illegible]
   6 [illegible]
   7 [illegible]
   8 Hyp[illegible]
   9 [illegible] emboli

B [illegible]
   1 [illegible]
   2 [illegible]
   3 [illegible] prostatic [illegible]

C [illegible]
   1 [illegible]
   2 Incre[illegible]
   3 [illegible] emboli

D [illegible]
   1 [illegible]
   2 F[illegible] on phy[illegible]

E Rh[illegible]
   1 [illegible]
   2 Ankylosis

II [illegible] Reducing H[illegible] of Com[illegible] Bed Re[illegible]

A [illegible]
B En[illegible] of deep breathing ex[illegible] to pr[illegible] pneumonia
C Cont[illegible] emphasizing frequent [illegible] ging of position by [illegible] maint[illegible] of proper [illegible] and rigo[illegible] skin [illegible] to prevent de[illegible]
D Improv[illegible] of venou[illegible] by el[illegible] of lower ex[illegible]
E Foot cradl[illegible] half shell [illegible] supporting pillow and other orthopedic measures to prevent physical deformiti[illegible] (see page 323)

ENVIRONMENT

Tempe[illegible]

A R[illegible]
   1 Win[illegible] comfort range 17 4 21 8 C (63° 71 F)
   2 S[illegible] comfort range 18 [illegible] 24 C (64 75 F)
B Individ[illegible] T[illegible] Tol[illegible]
   1 Coole[illegible] preferred for febrile and heat sen[illegible]
   2 Warmer temperatur[illegible] are p[illegible] for [illegible] elderly

BED POSITIO S
(and Indic tions)



SEMI FOWLER
Dyspnea from any ca e



SHOCK
Vasomotor collapse (p im ry nd second y shock)



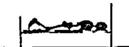
FOWLER
Ma k d dyspn a f om any a e



HEAD OF BED ELEVATED
In ed int a ranial pr s
Hi t a h rnia



CARDIAC BED
M rked dy pn a f om any ca e
(more s tisfa tory than ch i)



ARTIFICIAL PRONE
Artificial r spi ation
Decubitus ul ers of b ck
Vomiting or obstruct d re pir tion in omatose patients



GENU PECTORAL (kne he t)
Dyspnea in child n
R ct l and igmoidoscopi examination



LEGS ELEVATED
Inf ction inflamm tion phl bitis or edema of the low r e t emities

TRENDELENBURG
F llowing pel ic operations

pati nts cold sensitive patients and patients in vasomotor collapse

Room Humidity

A Relative humidity of 40% is consid red ideal with an accepted range of 30 70% In general, higher humidities are tolerated bett r with lower room temperatures and vice versa

B Higher humidities may be of value in the treatment of patients with asthma

Ventil tion

Circulation of air may be as essential to comf rt as proper warmth and humidity especially in certain respiratory and cardiac illness s Avoid drafts

Social Contacts

A R t i tion of Social Activiti This includes curtailment of visitors tel phone radio and letter writing when indicated *These limitations should seldom if ever be imposed over a long period of time* They apply principally to

1 Seriously ill patients
2 Patients with contagious diseases
3 Certain disturbed, psychotic or delirious patients and acutely hysterical patients (However relatives and other familiar figures may lessen conf sion and relieve anxiety in some cas e)
4 Markedly dyspneic patients

B *En ou agement of Soci l Activiti*

1 Most patient not in the above cat gories
2 Chronically ill patients
3 Certain d pressed emotional states

Special Consideration

A Elimination of noise

B Darkening of room for patients with photophobia or with tetanus Not advised for delirious patients

C *Elimination of d st in cases with respiratory diseases or dust allergies*

D Elimination of allergenic materials in pillows bed linen curtains room furnishings etc for allergic pati nts

Fa to s in Recomm nd tion of Hom Manag m nt for Bed Pati nts

A Ge l

1 Hospital facilities in community
2 Financial status of patient In g neral, if pati nt i able to afford it hospital care is preferable for bed p ti nts
3 Proximity of patient s home to physician s office
4 Character of disease (dangers to patient attendants mem bers of the family and community)

B Home Factors

1 *Hom facilities (space heat electricity furniture etc)*
2 Intelligence and cooperativeness of patient and family
3 Nursing car Availability of desirable attendants (may be required night and d y)
4 Duration of di ase (consider expense of prolonged hospi talization)

Gen ral R l s for Home Manag m nt C s e

A. P ep t n of S k Room
1. M patient to s table room considering
   a. Ventilation
   b. T mperat re
   c. Electrical fixtur s
   d. Bathroom f cilities
2. Rent hospital bed or us plain narrow bed raised on blocks to convenient height for attendant
3. Remove all unnec ss ry f rniture and acc ssories from room especially in iso tion cases
4. Use simple bed linens and blankets

B. Attenda ts
1. Obtain servi es of trained or practical nurse for complicated or serious contagiou ases
2. Instruct attendant concerning patient s dise se th rape tic obj ctives dang r signals etc P t necessary d tailed di ection in writing
3. Explain medical situation to re ponsible per ons empha sizing obs rvanc of following instructions
   a. Activity status of pati nt
   b. Proper bed c re
   c. Proper diet and fluids
   d. Social contacts (visitors t lephones correspondenc)
   e. R gularity of treatment
   f. Informing phy ician of any unusual change in patient

Obt ining Hom Nur ing Se vi e

The di e torie of the loc l t lephone company community he t or health council provid leads to the offici l regi tri s for full, part time or hourly prof ssional and practi l n rsing se vi es These ag ncies m y assist the physi ian in arranging f r other home s rvic s indicat d

Contagiou Di Manageme t in the Hom

A. Qu antine R qui em nts
1. Fam li iz you s lf with the isolation and qua antine re qui ements of the dis e in question, as applic ble to your community Determine whether or not the di se is re portable
2. Empha ize the family's responsibility to th c mmunity

B. P epa tion for isolation
1. St the important points of isolation technic as the case d mand Point out the a s of spread
2. Att mpt to approximate hospit l isolation t hnic
3. Utili e service of attendants who ha ither had the disease or who have been immunized against it Either immunize o remove susceptibles from the home If necessary obtain the services of a tr ined nur

C. Is lation Te hni
1. Defin o d ignate the isolated room or area of the hou e The select d a ea is to be used by th patient and attendants and NO OTHERS Childr n ar never to ent r this area I struct att ndants to wash hands in soap and w ter caref lly before ent ring and on le ving the room
2. Disposabl paper masks and caps are now vailabl quite cheaply or large handk rchiefs may be used as masks or

lealg ar Simpl reara ing room time tot n grwra shou d be worn in the r mm and ahould be lonned and removed in the conte tiwall a l in te hel ma er (inside of gown kept el an)

CLINICAL OBSERVATIONS

C vald ra ie i rmation of th ra se tic A well as diagnostic alue may be g rane from a ar y e ntai ed clinical record S ch in rmati n ma p ovide al ab e data a out re o n e lo tr at me t templi ations and prognosis f the disea a i mi b g in aure the general c m et of the p ti nt The following bri f cli ical data are ier ud f for the convenien e of the cl n clan in form 1 ting a g an fo f l owi g i e cou e ef pati nts The physician s task is considerably simp f d if the pati nt is in a hosrital wh re ad quate nursing f ilii e ar a ai bl Skilled n rsing super ision and car f l r e g nd a of patient a a tiviti a vit l signs medi a tions and K er impo rt nt da a mak possible a more effe ti e managem t of the pati nt

Body T mpera ur

A N i d Diet rmi ion and N m l Ad lt V l e

Ar a	Av rage Temp	R ng of Temp
R ctal	99 6 F (37 5 C)	98 5 99 9 F (37 37 7 C)
V g n l	99 6 F (37 5 C)	98 5 99 9 F (37 37 7 C)
O al	98 6 F (37 0 C)	97 7 99 0 F (36 37 4 C)
A ill	97 6 F (3 5 C)	

B F vers

1 Types

a Remittent Of days or w eks duration with alternating periods during which temperatu e is normal (e g bru cellosis or t rtian malaria) Temperature should be tak n t i d q i d for a prolonged period (weeks to months) to d mon trat the alt rnating f brile and afebril periods

b Intermitt nt Temperature drop to n rmal or a bnorm l level once or more in 24 hours (e g septic fevers and arly tubercul sis) Temperature must be taken q i d to d monstrat the variation within the day

c Unr mitt nt or continuous Temperatur ne er normal during 24 hour period (e g pneumonia influenza) T mperat re must be taken q i d or at tim s every 2 3 hours to d mon trate the sustain d h ra ter of th f ver

2 Causes Infectious diseases certain drugs for ign pro tein respons to e t rn l heat neop la tic diseases dis turbance of h at regulating c ter and neuroses

C S bn rmal T mpe atu es May be due to profuse perspiration hemorrh g hock d r sed B M R and m ntal depression A ommon c use of recorded a normal temperatu e is insuf ficient time allowed for t ki g temperat re Subnormal t mper atures m y indicate failu e in a s riously ill pati nt and dem d

immediat supportive int rvention In such cases t e
r al tem s ati w tif ed at hea Q estionable or l
t mpe t re hould be cr hed by rect l t mpe t
Jun ng gebri e perio s il is o en ad is le to
de m e the temperatures t it re al me hod

Pul
A Ch a t istics whi h shou l be not d and r orded include
1 R (no ma ly 60 80 per minut ari ble) Comp re ri al
and pe i her l pul e in p ti nts with arrhythmi
2 Rhythm Note r gularity period ity and mi s d be t
3 Intensity Not f line s of th pul
B I t inc ing the p rate in lude c rdi c rrhythmia
f ia f e h mor hage sh ck rtion emo
tional fatigue o yg n d fic t CO_2 ess in r d B M R
and rt in drug
C F t r a d r ng th puls rat i lud thi ti train g
he block, in d intr ranial p s e de r a d
B M R and j un e

R p a ion
A Cha teri ti s whi h hould be not d and r c rd d in lud
1 Rate (norm l ange 14 20 per mi ut)
2 Vo um and depth, g deep breathing of K sm l typ
3 Ir gula ity and pe iod ity e g alt rn ti g hyperpne
and ap ea of Cheyne Stoke type
B F t r i sing the rate inc le is i cre sed
B M R o yg n defi it, CO_2 e cardiac f il re pulmo
n y dis a a mi h m hage f r CO poisoning, drugs
keto is moti nal tr s pain r l f il r and me hani al
int rf r with bre thing
C F d r a g t e r te incl i h p otic and narcotic d gs
and in l i t a r ial p essure

Blood P a
A De il nd h t fail to be n d and r orded includ
1 Position of p tient t i m of recording
2 Sy t li l vel by both p lpat y and a scult tory m thods
3 Stre gth and cha a t r of puls tion f lower e tremiti s in
the p e e of br hi l hype t ion
B Ph iologi l f t rs whi h incr as blood pre e includ
in g g obe ty (f incr se l light to mod t in
obe pers thi is prob bly d e to relati siz f pr s
e cuff t a m) dig tion it m t cis itting or
t nding position (mpare with blood pres in r cumben y)
C F th l gic l fa t whi h i r se blood p s In lud
I d le g and malig a t s ti l hyperten ion in
e d intracranial press re in r a d B M R dr al
t mora l mpsia and aortic oar t tion
D P th l gi l c f hypot nsion include h mo rh g shock
d bili y t f r rdiac f il re d cr d B M R
and hypo dr l rti lism (Addis dis ase)

I l tion hip of Vit l Sign
A P l T m t R t t hip

8 General Observations

1. General rule For every degree (F.) of temperature rise the pulse rate usually rises 10 beats per minute, i.e. 98 60/min 99 70/min
2. Diseases in which pulse rate may be low in proportion to fever (relative bradycardia) Typhoid fever undulant fever influenza meningitis infectious mononucleosis
3. Diseases in which pulse rate is usually high in proportion to fever (relative tachycardia) Scarlet fever rheumatic fever diphtheria thyrotoxicosis subacute bacterial endocarditis tuberculosis terminal or unfavorable pneumonia (pre shock)

B. Respiration Temperature Relationships
1. General rule Respiratory rate roughly parallels temperature changes
2. Exception Intrathoracic or respiratory diseases (relative tachypnea, hyperpnea or dyspnea)

C. Pulse Blood Pressure Relationships
1. General rule The same factor causing an increase in cardiac rate usually cause an increase in blood pressure
2. Exceptions
   a. Relative tachycardia Same as for pathological causes of hypotension
   b. Relative bradycardia Renal disease benign and malignant hypertension, increased intracranial pressure

D. Mental Status Temperature Relationships
1. General rule Delirium may accompany high fevers
2. Exceptions (when patients are more susceptible to febrile delirium, i.e. with lower fevers) Emotional lability psittacosis typhus fevers and the influence of certain drugs (e.g. barbiturates)

Miscellaneous Observations and Precautions

The following clinical observations are also important in determining the general comfort and in following the clinical status of the patient

A. Fluid Intake and Output Consideration of the fluid balance of the patient should include the following
1. Clinical evaluation of state of hydration
2. Estimation of need for fluids
3. Types of fluid administration

(For details see Chapter 2 page 10)

B. Condition of the Skin Evidence of decubiti (bed sores) heat rash, hyperhidrosis drug rashes etc

C. Condition of the Mouth Lips and Nares Evidence of chafing ulceration sordes dehydration avitaminosis etc

Local conditions in the mouth permitting patients should brush their teeth or have their teeth brushed with some simple dentifrice at least once daily

Patients should be given the opportunity to rinse their mouths after each meal Plain tap water physiological saline solution, or Alkaline Aromatic Solution N F (diluted 2 1) are equally satisfactory

Care must be taken that the patient is in an adequate state of nutrition and hydration

D. Appetite Question patient regarding appetite and qualitative and quantitative food desires Check actual food intake by

examination of outgoing trays Determine reasons for rej ction of food Avoid prolongation of unpalatabl or restricted diets for periods in xcess of actual requirement (see section on Di t page 44)

E Elimination Bed patients are generally prone to constipation This m y be ex ggerated by the illness itself diet et for bed pans diets and cert in drugs When knowl dge of limin tion is especially important gross inspection of all stools pass d by the patient may be ne essary (see Constipation, page 254) Daily inquiry regarding elimination should be made of ea h patient

F A ptance or Rej ction of Medication Always inquire as to n l r j tion of med tion The patient s objections may constitut v lid reason for modification or cess tion of drug therapy Stat ments as to untoward reactions from medi cation alw ys deserve careful e al ation

G Sleep and R st The p ti nt s st t ments about amount of sleep or re t m y vary consider bly from known observations Pro vide suitabl envi onment for sl eping and resting by ins ring a minimum of i t rruptions by prof sion l s rvi es atten dant visitors and ward mat s Routine" sleep inducing drugs should be avoided (s e Insomnia p ge 35)

H Ment l R ion of P tient Ob erve patient s mood and be havior refully W t h f mental depression, which is often associated with costly confining serious or chronic illne ses

LABORATORY AND X RAY STUDIES

Ord ring Laboratory and X ray Studi s

Th f l and r t onal o de ing and perfo mance of labor tory ray diagnosti and other spe ial tudies constitut s an es ntial pha of the management of the pati nt The blood ount u inalysis se ologi al test for syphilis and perh p chest x r y should be performed routinely on all hospital patients

A Spe i l di gnostic studies may c ll for ca f l planning and integrating with the the apeutic program and m t not conflict with the tre tment sched l

B Improperly perfo m d or unnecessary l boratory and y studie aside from the dis omfort, xpen e and inconve ience they c s the patient may prolong hospitalization

C It m t be r membered that certain labor t ry studies may re quire d hydration (e g Addis test or pyelograms) whe it may be clinically dangerous (g pre ipitation of renal failure etc)

D Likewis forced fluids (e g P S P) m y be contraindi ted in the presence of nausea or vere cong ti failure et

E X r y Pl in and dye studies should p ec de all b i m con t ast studies and ret ograde b ium (enema) studi s should p ede upper g strointe tin l studi nce revers l of this s quenc of studie will cause n edl s d lay

Chapter 2

FLUID AND ELECTROLYTE THERAPY AND PARENTERAL FEEDING

FLUID BALANCE

In c ns d ri g fl id therapy it is ne ess ry t at the problems of wat r and e ectrolyte metabolism be considered independently of e ch other The electro ytes ar intimat ly concerned wi h the maintenance of norm l cel lar m tabol sm acid base regu ation and with water t e maint nance of osmotic pressure in both the ex racel ular and intracell ar f u d compartme ts Water in ex cess of the q tity ne essary f r mainta ning the i otonicity of body f ids is required for normal bodily function The administration of solutions of isotonic electro yt to the pa ient cannot be consid red as providing a ilable w t r f r in t e excr tion of these s me electrolytes water must likewise be ex reted to keep the sol tion (urine) almost isotonic

Daily Oblig tory W t r R quir me ts

A consid r ble a ount f w t r (free from ele trolytes) is n cessary for n rmal bodily function These oblig tory water re quirem nts are related to e rgy expend. ur they are given i the following table

AVERAGE DAILY WATER NEEDS FOR EXCRETION

M thod f E retion or Lo s	Vol me of Wat r E cret d per 100 C lori of Food	Volume of Water E r ted per D y*
Imperceptible loss (lungs and skin)	44 cc	1100 cc
[illegible]	3 5	100
Sw at (perceptible)	V ries with extern l temper tu e M y be high	0 300 (more at high t mpe at r)
U ine	V ries with amount of wa te products to be ex reted (see chart page 12)	A erage minimum 1000 cc (if sp gr more than 1,0 0)
Needs for excretion oth r th n uri		1200 1500
Total (including urine)		2200 2500

* B sed on 2500 Calories food intake

For gross clinical estimation the imperceptible loss of water may be calculated as 10 cc /K (5 cc /lb) body weight per day

From th t h e on th pre ding page it is een t at ab ut 1200 1500 cc of wa er are re d d per d y in a l ition t the amount of wat r necessary f r r mov l of wast s in the urine

The kidney i the organ w ich is respon ible fo r gulation of the e ctrolytes of t e xtra e ular fluid compartment and excre tion of th end products f metabo ism In o d r to p r th constancy of t extracell ar en ironment the kidney has th abi ity to concentrat the e d p od ts of m tabolism Due to this c n trat g a ility it is n ce ab t on e w t This abilit to on entrat is l nit d t e urine c n be nc tr t d t a ma imum pec fic gr vity of approximat ly 1 032 H w r the eff i n y f the kid y i once at f l of r p dly b ve 1 025 speci l gr ity In renal d se se st a when th ability of the kidney to o nc tra is lost large amount of w ter m st be t k or dmi i t ed in o d r t r move wa t s

Cli l E lu tion of St t of H d t w

A H y t i i in nd f i lo s S dd n weight g in a d w g t los s should be not d since th y m t fr q ntly in i c t ha g in w t r bala

B Physi l Ex mination Ob rve body t mperat r skin hyd a t (t g i tong m co memb an s h l r te d blood pr ss

C Labor t y Te t Ob e ve urine vol m and n t ation b o d oun h mat crit s rum pr t i s nd N P N

D N i g Not l fch pa t n u ll Detailed i take nd ou p t re r d whil pati nt is unde ch r tion ar xt em ly val bl Output shou d in l d t ot only a r ord of ll m asurabl fl id losses but al o ot s of ob rv tions on le obviou loss such a in re d pe spir ti n and r spi ation K pi g the e ec r is r qui s con ide bl effort so th n i g taff shou d be notifie d wh this i rm tion is no long ne ded

F im tion of N ed f Fl d

It s of the ne essity of a minist ing fl id t c r the oblig t ry non e l tory mechanism plus suffi ient fl ids t permit r t on of m t bo i w te by th kidn ys ate m reme t of the 24 hour u ine vol me nd pe ifi g avity will id greatly i d t rmining wh ther suffici nt fluid is bei g a imi ter d App oximat ly 1 5 to 2 0 Gm of ri y s lid e et d pe day pe 100 C l s metaboli ed This amou ts to appro im tely 3 50 Gm of solid per day t the ave ag ad lt Mor on ntr t d urin g ne lly mo e p oportion t ly gre ter amount of metabolic wast although this r lation hip doe ot h ld tri tly true in diat ete n ph itis a d e tain oth r di whi h m y a t r r i e con tr tion by th p s n e of ab m l mounts of tain b t s The rel ti n hip betw n pe if g vity l me and i ry s lid per 24 hou ar shown i the t bl on th followi g p g

(2 7 g ams of gl cos or 3 9 g ms f lbumi will r i e th pe ific gravity of 1000 cc of u i e 0 001 at 15 C)

Sp Gr Urine	Gm Solids per Lit r	Urine Vol /35 Gm S lids (Avg Sp Gr)	Urine Vol /50 Gm S lids (A g Sp Gr)
1 035 1 030	81 79	400	600
1 030 1 025	75 87	475	655
1 0 5 1 020	67 55	510	800
1 0 0 1 015	55 43	715	1000
1 015 1 010	43 31	950	1350
1 010 1 005	31 19	1400	2000

Any sudden and marked change in t e patient s hydra ti n sta us dur ng t e latter portion of the collection period will fail to be reflected in t e sp gr of the total 4-hour specimen

ROUTES AND TYPES OF WATER ADMINISTRATION

Rout and Availability of Water for M t bolism

A Or l L al route In cal ulating fl id intake remember that most foods contain w ter and that about 12% of all calories met bo ized form w ter (of oxidation)

B Parenteral When considering water balance note that

1. *The w ter in glucose solutions is all available for metabolic and excretory purposes*
2. Solutions containing electrolyt s (e g normal saline) yield little water for metaboli purposes for the electrolytes re quire water for e cretion
3. Protein hydrolys tes 1 Gm of protein equals about ⅓ Gm *of urea for excretion in urine Therefore depending on* urin ry specific gravity some water may be available from 5% protei hydrolysat s if the electrolyte content is low (see p ge 9)

C R ct l Rarely mployed Water or 5% glucose in water may be a mini tered by slow drip if no large bowel disease is pres ent This is all available *for met bolic purposes*

Types of Wat r R gim s

A U tr t d (* d l b) Indicated for the average patient in a n rm l physiologi l state when dehydration is not present 1800 3000 cc of total fluids daily are adequate except for in creased loss by sweating

B R tri t d M y be indicated when factors are working which t nd to c se accumulation of body fluids Restriction of oral fluids may be indicated when for any reason it is undesirable to introd ce more than small quantities of fluid into the GI tract

1. Anuria or oliguria (e g lower nephron syndrome see page 303)
2. *In conjunction with ketog nic diet*
3. Prep ration for certain laboratory st dies (Addis test pyelography)
4. Restriction of oral fluids Conditions interfering with pas sage of fluids through the gastrointestinal tract e g swal *lowing disorders persistent nausea and vomiting gastric* dilatation and intestinal obstruction When these conditions are present it is necessary to replace fluids by the parenteral route (see next page)

C Incre ed (Forc d) M y be indi ted when f tors are working whi h t nd to depl te body fluids or wh n it is desired to hasten cretion of toxins or m tabolite The addition l fl ids must frequently be given by parent ral routes

1 High atmosphe ic t mperature
2 High body t mper ture (fever)
3 Diuresis (e g diabetes insipidus r nal insuffici ncy with polyu ia)
4 Exudations from inflam d s rfaces (speci lly s vere burns)
5 Diarrhea
6 Vomiting
7 Draining fistul
   { G troint tinal s retions normally total 7000 8000 cc per day so loss here may be great S e ch rt on page 14 }
8 Exoge ous or endoge ous poi ons H vy metal poisoni g ren l failure (*except when oliguria or anuria is of renal origin*), diabetic coma tc

ELECTROLYTE AND ACID BASE BALANCE

Norm l con ntration of both i tracell lar and extrac ll l r lectrolytes is necessary for lif Although the intr llular nd xtracellular l ctrolyt s are at ppro im tely the same osmotic p ss r the individual ions are diff r nt The electrolyt s pres ent in the body are grouped into positive ions (tions) and n g ti e ions (anions) The cations ar con ned with a l the functions of the elect lyt s The anions ppar ntly rt no d rect pha maco logic a tion but are intimately involved with id b equilibrium The f llowing t bl gives both intracellul r and e trac ll l r l tro-lyt s grouped as cations and ions

VALUES OF EXTRACELLULAR AND INTRACELLULAR ELECTROLYTES

Ion	Extr c llular			Intr ell lar	
	mEq /lit r			mEq /liter	
	A g	Rang	mg /100 cc	A g	mg /100
Positive					
Na	142	135 147	310 340	13	30
K^+	5	4 6 5 6	16 22	140	550
Ca^{++}	5	4 5 5 5	9 11	0	0
Mg^{++}	3	1 5 3 0	1 8 3 6	45	54
Tot l	155			198	
Negative					
HCO_3	27	25 30	56 65	10	22
Cl	103	100 110	350 390	3	10
HPO_4	2	1 8 2 3	3 4	100	200
SO_4	1		4 8	20	96
Org Ac	6			0	0
P ot in	16			65	
Total	155			198	

Th se r pproximat val s of muscle
*Volum %

From the previous page it is apparent that the electrolyte pattern of the intracellular and extracellular components are entirely different. Whereas sodium chloride is the main component of extracellular fluid, potassium phosphate possibly and protein complexes is the main component of intracellular fluid. This is of foremost importance in consideration of therapy (see page 21) especially since only the extracellular components are available for clinical measurement.

Since little is known regarding the functions and means of regulation of the intracellular electrolyte concentration, discussion of these electrolytes must be concerned primarily with the extracellular electrolytes. By a knowledge of the extracellular electrolyte concentration and the [illegible] quantity [illegible], some inferences can be drawn [illegible] the intracellular alteration.

VOLUME AND ELECTROLYTE CONTENT OF GASTROINTESTINAL SECRETIONS AND SWEAT*

Source	Average 24 hr Vol in cc	Electrolytes in mEq/L			
		Na	K	Cl	HCO_3
Extracellular Fluid		145	5	111	8
Gastric Juice Containing Acid	2500	10-110	1-32	8-155	0
Achlorhydria		80-120	1-30	100	20
Bile	500	130-160	2-12	90-120	38
Pancreatic Juice	700	110-150	2-8	50-95	110
Small Bowel Suction	100-6000	80-150	2-8	40-135	30
Ileostomy Recent	100-4000	100-130	5-30	90-140	30
Adapted	100-500	50	3	20	15-30
Cecostomy	100-3000	50	8	40	15
Feces (Formed)	100	< 10	< 10	< 15	< 15
Sweat	500-10,000	0-100	0-5	0-100	0

Minor alterations of ion concentration occur in interstitial fluid in response to physical laws governing the production of an ultrafiltrate of plasma.

*Modified from Lockwood and Randall: Bull. N. Y. Acad. Med. 25: 228, 1949.

Reprinted from Krupp, Sweet, Jawetz, and Armstrong: Physician's Handbook, 8th ed., Lange Medical Publications.

FUNCTIONS OF THF ELECTROLYTES

The ele trolytes of th e tracellul r fluid serve three p in ipal function

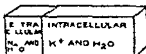
REGULATION OF OSMOTIC PRESSURE AND WATER BALANCE

The osmotic pre sure of both the intr c llul r d extr ll lar components of the body are at all tim s qual In h lth the osmotic press re is equi nt to about 310 mil. osmol per lit r Th total body wat r is e q al to about 40 65% of the body we ght with an averag of 55% f r males and 47% for females The alues a lower in obe indi id ls higher in l an muscula l di id ls About 15 17% of the body w ight is in the extr ll lar fluid com partment and about ⅔ of this is int s sec lar A me tioned bove the ioni omposition of the e tra llular and intr ell l fl ids is e tirely differe t and this d ffer nc is m t ta ned by t ra llular e zyme system s whi h remove unwant d lectro lytes (g odium) a r pidly as it diff s s into the c ll hift water betwe n t e t o compartmen s is the principal means o maintaining osmotic equilibrium whenever there are a terati ns in ele trolyte or w ter concentration in the body The significant l ations that one ncounte s ll ically are illu tr ted below The d ag ams are oversimplified and f ll t show the elect olyte shifts th t occur in p thological conditions clinic l stat s ge erally t d to b compl x problems of th se rather th n simpl l gi entities

FLUID COMPARTMENTS

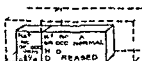
N rmal

This f gur repr sents tot l body wat r with the no mal ext llular t t acellul r fl id and elect olyte once tr tion



Simple Dehyd ation Without S lt Loss

In thi ondition th el t olyt s r concentrated the xtr c llul r intrac ll lar fluid ratio i the s me s f r a no mal

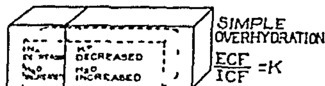


11 Function of Electrolytes

A Common Clini al Condition Lack of water gastric vomiting
B Diagnosti Points Marked thirst (probably a symptom of intra c ular d hydration) poor tissue turgor high urine specific gravity high hematocrit all extracell l r electrolytes may be elevated but proportions normal
C Tre tme t Administer fluid without electrolytes Water orally 5 10% glucose in water I V

Simpl Overhydration

In this condition the electrolytes are diluted the extracell lar intracellular fluid ratio is the same as for normal



A Common Cli i l Conditions Excessi e fluid intake without salt Excessive el ctrolyte free fluid administration to a patient with oliguria or anuria
B Diagnostic Points Edema low urine specific gravity if pati nt urinating low hematocrit all e tracellular el ctrolytes re duced, but proportions normal Convulsions if extreme
C Tr atment U ually withholding of fl id and electrolytes

E c e Sodium Retention (or Rarely Intracellular K^+ Loss)

This l ads to excess fluid in the extrac llular compartment with depletion (dehydration) of the intracellular fluid



A Common Clinic l Conditions Cardiac failure liver failure with ascites renal disease with failure to excrete sodium ex cessive sodium intake administration of some steroid hor mones or ACTH
B Diagnostic Points Edema patient may be thirsty low hemato crit el vat d blood pressure extracellular sodium may be nor mal or elevated urine specific gravity usually low
C Tre tment Restriction of dietary sodium or administration of agents to induce sodium loss by kidney (e g digitalis mer curials Diamox® etc) Water orally 5 10% glucose in water I V (to provide electrolyte free water)

Excessive Na^+ Loss (Low Sodi m Syndrome)

This leads to diminished extracellular fluid and an increase of intracellular fluid

SODIUM LOSS



A Common Clini l Condition Low sodium intake e cessive us of mercuri l di retics excess fluid intake without sodium after prolonged sweating. Addi on s disease sodium binding r sin therapy sodium loss with ga trointestin l fluid loss e
B Diagnostic Points Low blood pr ssure muscle cramps low u ine vol m bsence of thirst
C Tre tme t Admini tr tion of sodium salts in once t tions gr at r than isotonic (s e page 22)

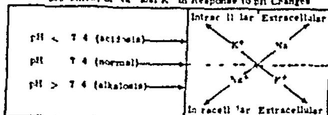
MAINTENANCE OF NORMAL NEUROMUSCULAR FUNCTIONS (Neuromuscular Irritability)

The electrolyt cont nt of the body is k pt rema kably constant chi fly by the kidney s sel ctive ability to excrete or cons rve indi vidual ions The l vels and balance of the various positive ions (cations) a e important in m intaining normal neuromuscular irri t bil ty and they vary little in health Wide variation are incom p tible with life a d symptoms arise when e c ess or defi ien i s occur

Int rr l tion hip of Electr lyt and N u om cul Function
The e t r l tion hips between e t ll lar ion con ent ation and ne rom cular function a e not cle r Ma y of th signs and symptoms of d ficienci and excesses of ions m y be due to alt r ations in intracellular content which may or may not be d t t ble by the m urem t of extrac ll lar elect olytes and fl id alone

A Vari ion i Eff ct of H rmon s An excellent ampl of this is found in the eff ct of two hormones upon s rum pot ium l vels nam ly d oxyco ticost rone and testosterone Both of these hormon s can low r the serum potassium mark dly How ver symptoms of pot ssium d fici ncy n ver develop with te tosterone It i believed th t this is becau e the h rmone c s an intrac ll l r mo em t of potassium and ret ntion of potassium by the body Desoxycorticosterone however caus s ma ked urin y los of pot ssium with intra and extra ll l depl tion and m y l ad to symptoms of potassi m d ficie cy
B Eff ct of pH on El ct olyt Th pH of the blood is important in d t rmin g thi int ll lar xtrac ll l r hift of ions This is most noti eable in the ca e of sodium and potas ium In a idosi sodium is transferr d f om the c ll to the s rum to add to bic rbonat buff system and i repl c d i tr ellularly by potassium (In addition intrac ll lar potas ium is lost to the body in acidosis) In lkalosis the rev rse occurs sodium m ve int cellul rly while potassium leaves the cells The chang s a e illustrat d on the following pag

Mo ement of Na and K in Response to pH Changes

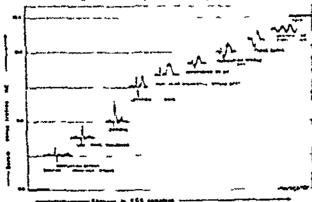


SYMPTOMS OF EXCESS AND DEFICIENCY OF THE POSITI E IONS

Positi e Ion (Cation)	Symptom of Excess and Clinical Caus s	Symptoms of Deficiency and Clinical Causes
Sodium Na (N rmal 142 mEq /L.)	*Edema* Cardiac failure Cushing s syndrome Ex ss sodium (Administration of some st oid hor mones or ACTH) Cirrhosis & as ites R l f il r	Mu cu ar weakn ss cramps nausea and vomiting low blood pressure absence of thirst Adi son s disease Excessive sweating Acidosis (metaboli)
P t ium K (Normal 5 mEq /L.)	Mu u ar w kn ss and p ralysis ulti mately cardiac ar r st (e E g page 19) *E ces potassi m* a ministration Addison s disease R al f ilure	Mu cul r weakness and paralysis specially respiratory and card ac (see Ecg pag 19) Low pota sium int ke Starva tion GI obstruction *Poor absorption Steatorrhea* e t ritis short intestine E cessive potassi m loss GI Vomiting, di rrhea et Cutaneous Wounds b rns Renal Tubular defect diabetic a idosis metabolic alkalosis Hormonal Adre al steroids (see page 416) Shift from xtracellul r t intra cellular space Hormonal T stosteron (see p ge 419) ins lin glu ose Idiop thic Familial periodi p r lysis
C lci m Ca^{++} (Normal 5 mEq /L.)	Met st tic c lcifi a tions renal calcino sis Hyperparathyroid ism	T t y Acidosis (met bolic) Hypoparathyroidism Osteom lacia (+)
M gn sium Mg^{++} (Normal 3 mEq /L.)	Dep s on of C N S and muscle I V administra tion of magne sium salt	Non in l nan l tany i possibility

CORRELATION OF THE SERUM POTASSIUM CONCENTRATION AND THE ELECTROCARDIOGRAM

Providing there is no pa l l change in N and Ca



(From Krupp Sweet Jawet and A mstrong Phy i ian s H ndbook 8th ed La g M di l Publ tions)

Eff cts of El t olyt n Electroc diogr m

In a d tion to m ur m t of e m con t ation lone th E g may be of val l diagnost of ion b m lili specially lt rations occ rring duri g therapy Be se of the ompl x ion int rrelationship th t occur m y p tt rns report d are of q tionabl pecifi ity The m t import t ar thos for Ca and K

A $\underline{Ca}$ Cal ium def cie cy prolong th Q T i t val Calcium xc horten the Q-T int rval The qua tit tion of thes changes has not be worked out

B $\underline{K}$ The potassium ha ges are best ill str t d by the bo e d g m The appe rs to be int rrel tionship between Ca^{+} a d K both clinic lly in t m f symptom d E g eff ts their symptom and E g eff t a ant gonistic and a defici ncy of on m y can l out a d fl i n y of th other

C $\underline{Mg^{++} \text{ and } N^{++}}$ No specifi E g hang h ve bee d ribed fo m gn um or sodi m ion hang how ver th eff ts f od um app t ant gonize those of potassi m

D R spir tory ldosis ind d by high on trations of CO_2 l inspi d ir le d to in ed height of R d T w el tion of -T d pre sion of ST_3 a d at tim i ve sion of T_1 o T_2 both

A tion f N g ti lon

Th neg i ion re concerned alm t ntirely with osmotic equilib i m and pH chang s e c pt f the s r m ino g nic phos ph ru The phospho s appears t be ded for p ope tiliz tion (l pho phoryl tion) of gluc s a d po ibly f tty a id nd so d qu te quantiti m y b import t in ddition t I V gl os when the l lt is indi t d

mEq/l	Normal	R spir tory A id si ad Alkal sis				Metabolic Acid [illegible] d Alk lo is			
		A do s	Compensa m	Alk los	Compens ion	A do s	Compens m	A os	[illegible]
H HCO_3	1.35	> 1.35	> 1.35	< 1.35	< 1.35	1.35	< 1.35	1.35	> 1.35
B HCO_3	27.0	27.0	> 27.0	27.0	< 27.0	27.0	27.0	> 27.0	27.0
S rum CO_2		I re ed		Dec ed		Dec d		Inc d	
R tio	1/20	< 1/20	1/ 0	> 1/20	1/ 0	1/10	1/ 0	> 1/ 0	1/ 0
pH	7.4	< 7.35	7.4	> 7.45	7.4	7.35	7.4	> 7.45	7.4
M chani m	Norm l	A idosis is due t r l on of CO_2 re ulting from im proper ventil tion. Compensa ion oc urs with ving of fixed b se by renal ynthe i of NH_4		Alk los due t ve blowing off of CO_2. Compensation oc ur by enal e retion of fi d bas		A idos w f ors los of fi ed bas e due to incr se and utn l tion of organic acids t d bet and of SO_4 and PO_4 et in renal d Compens tion oc ur by the blowi g off of CO_2 if pi ory mechani m i normal		A lo is due to e in take of a li or loss of acid Som ases re id to be due t e K ions (use of die otis). Compens tion oc urs by CO_2 ret ntion by body. If f rther alkali taken or re ined, compens ion is lost	
D as C us		A y d es in f ing w h p ope spiration pneu moni mphys m on g stive failu thma, poorly functioning p tor		Hype ve til on		R nal or Gl los of b renal f ilure d betic acid nal or d h ea		E ing l m, g i vomiting of HCl or us of ACTH or [illegible]	
T e tm t	Non	T at he unde lying d as If not contraindic t d give fl ed b s Cor e tion will r sult whe di as olves and CO_2 i blown off		R id b th by he into paper bag or by the 5% CO_2 and oxyg . Cor ect ion will occu fl ed b e will retur t no m l by the body ention of ba		R move ac as on and epl fl d ba by the of fl id and l et olyt s (if dimini hed). Cor ect on of H HCO_3 lts from pi ory on of CO_2		R p ac K d f l t does of K a off a nec ry) and any deficit in di t d by ing Cl . M y use NH_4Cl but with ution	

Acid Ba Equilibrium

The pH of th e t ellula fluid during life is maintained at 7 0 to 7 8 (average 7 35 to 7 45) A pH beyond this range is in compatibl with life The regulation of the pH within such narrow limits is the function of the buff r syst ms of the body P incipally the bicarbonate buff ces) thi buffer syst m is compos d of 1 35 mEq /liter of H_2CO_3 and 27 0 mEq /liter of B(base)HCO_3 which gives a ratio of 1:20 of H_2CO_3 to $BHCO_3$ This is repres nt d in the f llowing equations

$$\frac{H^{+}HCO_3}{B^{+}HCO_3} \quad \frac{1\ 35\ mEq\ /lite}{27\ 0\ mEq\ /liter} \quad \frac{1}{20} \quad pH\ 7\ 4$$

This ratio of 1:20 keeps the pH 1 7 4 r g rdles of th bs lute quantiti s of H_2CO_3 and $BHCO_3$ pr s nt The m intenance of qui librium of the bi bonate buff r system i ccomplished princip lly through two important physiologi al m hanisms the r spi atory and the metabolic m hanisms (se pag 20)

A The R piratory M ha i m (Lung and R piratory Center) Parti ipat s in r gul t ng pH by cons ving or eliminating th vol tile acidic constituent (CO_2) of the bi rbonat buff syst m as the need a i e

B The Met boli M h i m Sinc most nd products of meta bolic proc s s ar a id ions (PO_4 SO_4 HCO_3 and organi acids) it is important for the body to on e ve fi ed bas (N K Ca^{++} and Mg^{++}) to m int in pH at 7 4 The kidneys par ti ipate in this cons rv tion th ough two me hanism

1 By thei ability to secr t an a id u ine (maximum bout pH 4 2) so cons rving r lati ly more base than acid

2 By the ability of the ren l tubul to manufa tur NH_4 whi h combines with anion th eby allowing fi ed bas to be r ab orbed by the ren l tubules

TREATMENT OF ACID BASE AND ELECTROLYTE IMBALANCE

In the clinical man g ment of derang me t of th cid ba e and lectrolyte b lance the attempt is mad to ret rn the el t o lyte p tt rn to normal This is ccompli h d by determini g the levels of the important lectrolytes (N K Ca^{++} CO_2 and Cl) in the blood nd then administe ing the salts or olution ne e sary to return the el t olyte patt rn to normal

With normal renal function it is rarely necessary to be concerned with the individual electrolytes If fluid of proper osmotic pressure (i e isotonic hypotonic or hypertonic as the patient s state demands) is adminis tered the kidney will ad ust the various ions

Although many formulae have been advocated to calcu late replac ment of electrolytes their use is rather limit d for most abnormal conditions are mixed types no formula can yet det rmine intracellular needs However some general principles are assist in determining electrolyte replacement

2. Replacement Calculations

A. Sodium Replacement (and Cl when used with Na^+ or as NaCl) Because sodium is concerned mainly with osmotic pressures and because replacement therapy is used to effect movement of water out of the intracellular compartment, the estimation for Na^+ replacement must be made in terms of total body water.

Estimated total body water (in liters) × mEq Na^+ deficiency = Amount of Na^+ needed for replacement

Example: 70 Kg muscular individual has a serum Na^+ of 120 mEq/liter.

Estimated total body H_2O = 60% of body weight = 42 liters
Estimated sodium deficiency = 20 mEq/liter
42 × 20 = 840 mEq Na^+ necessary for replacement

Administer half the amount initially, the remainder in the next 24-48 hours. Give as salt by mouth or hypertonic solution.

B. In the case of the remainder of the ions, safe initial replacement can be made, especially when parenteral administration is contemplated, by estimation of the deficiency in extracellular fluid. This type of calculation is obviously incorrect in the case of K^+ since this ion is largely intracellular, but the amount calculated can be given quite rapidly without danger of excessive concentration being produced. In the case of HCO_3 replacement, it also fails to take into account the intracellular HCO_3. The same is true of Cl when given to replace HCO_3. For ease of calculation, this formula assumes an extracellular fluid content equal to 1/5 of the body weight. This estimate is not exact and is especially incorrect in cases of disturbed fluid and electrolyte balance.

$$\text{Amount ion needed (in mEq)} = \frac{\text{Patient's wt (in Kg)}}{5} \times \left[\text{Normal value of ion (in mEq/L)} - \text{Patient's level of ion (in mEq/L)}\right]$$

Example: 100 Kg man has serum CO_2 content of 15 mEq/L. How much sodium lactate is needed to bring serum CO_2 to normal?

$$\text{mEq of } CO_2 = \frac{100}{5} \times (27 - 15) = 20 \times 12 = 240 \text{ mEq}$$

Therefore 240 mEq of sodium lactate is needed by the patient.

Milliequivalent Conversion Factors for Conversion of Blood Chemistry Findings

To determine mEq/L of	Divide mg % or vol % by
Calcium	2.0
Chloride (from Cl)	3.5
(from NaCl)	5.85
CO_2 Combining Power	2.22
Magnesium	1.2
Phosphorus mM (millimoles)	3.1
Potassium	3.9
Sodium	2.3

Table for Determining Quantity of Salt or Salts Necessary for Electrolyte Replacement

S lt	Qua tity in Gr ms to Yield	
	25 mEq of cation	100 mEq of c tion
N Cl	1 5	5 9
N HCO_3	2 1	8 4
Sod t at (hyd at d 1 tive)	2 8	11.6
Sod lactat	2 8	11 2
KCl	1 8	7 5
$KHCO_3$	2 5	10 0
Pot c r	2	10 8
$MgSO_4$ (l tiv)	1 5	6 0
C Cl_2	1 4	5 5
C g ucon t	6	2 4
Ca	3 9	15 4
NH_4Cl	1 4	5 5

After calculatin the atient n need , select the solu ion to be used by referri g to the following list of solutions

LV FLUIDS AVAILABLE FOR CORRECTING ELECTROLYTE DISTURBANCES

Many fluid to meet arious th rapeutic needs have been d vis d and are comm rci lly obt inable The f llowing is a p rti l list of the s l tions a ailable bas d on thei el ctrolyt cont nt isotonicl y nd infl c on th id ba balance Som s avail ble as onc tr t to be dded to oth r flu ds When th se or ny othe el ct olyte olutions ar a d be tain the final fl i is t l t half i otoni and p fer bly i otoni or hypotonic when being given I V Is tonic sol tions ar 5% gl cose in w l o olutions of lectrolyt ont ini g about 150 mEq ch of anions and tions per lit r

If the fluid a e conside d in terms of th milliequivale t pe liter of thei indi id al ion th than a pe c t g s it becom s asi to s le t th be t fluid to co rect the disturbances that ar pres t By thinki g of fl ids in terms of mEq /liter one n lso d is ol tions n s ry to meet y disturbed ele trolyte fluid balan that m y occ r e g hypertonic NaCl (3 5%) sol tions to tre t sodium deficienci s El trolyte ds an be lc lat d from the f rm l on page 22 Before s l cti g the solution th fluid eds must lso be determined and on id ed in alc l ting the tot l l me n ded

N utral Solutions Containing Only Sodium and Chlorid

A I otonic Solution. Isotonic Sodium Chloride Solution U S P Injection of Sodium Chloride B P (0 85%)

Us e. Most widely used isotonic solution To replace lost base (Na) and chlorid

Constituents	% Sol	Gm per lit r	mEq /lit r of ions	
			N	Cl
N Cl	0 85	8 5	145	145

B Hypotonic Solution (0 45%)

Uses. To replace lost base (Na) and chloride and to allow ex cess water for metabolic needs

Constituents	% Sol	Gm per liter	mEq /lit r of ions	
			N	Cl
N Cl	0 45	4 5	77	77

C Hypertonic Sol tions Variable sodium chloride concentrations (3% and 5% given below)

U e. *To replace sodium and chloride in the treatment of low sodium concentration (see page 22)*

Constituents	% Sol	Gm per lit r	mEq /liter of ions	
			N	Cl
N Cl	3	30	513	513
NaCl	5	50	855	855

Solutions Yi lding Free Base Containing Only Sodium

Uses. To r place sod um without added anion (usually for cases of metabolic acidosis)

A Sodium La tat

1 *Concentrate (to be added to other fluids)* 1 molar solution 1000 mEq /L (11 2% solution, 112 Gm /L) Concentrat supplied in ampules of 40 cc containing 40 mEq /ampule
2 Isotonic Sixth molar sodium lactate

Constituent	% Sol	Gm per liter	mEq /liter of ions	
			N	La t te
Sod lact te	1 87	18 7	167	167

B Sodium Bi arbonate

1 Concentrate May be injected directly or add d to other fluids Supplied in ampules of 50 cc cont ining 45 mEq / ampule (3 75 Gm in 50 cc solution)
2 Sodium bicarbonate may be prepared for injection by adding chemically pure sodium bicarbonate to cool st rile distilled water *Do not autoclave or boil solution after* $NaHCO_3$ *has been added* 1 Gm $NaHCO_3$ 12 mEq

---

Lact te o idiz d to CO_2 *th r fore this compound yields f e* base

immediate and severe reactions on readministration Fever angioneurotic edema urticarial and other rashes and peri arteritis nodosa may oc ur

Hist ry of previous administration should be obtained Cross sensitivity to various s lfonamides may exist Severe symptoms may be avoid d by giving a t st dose of 0 5 Gm (7½ gr) and observing for 6 hours

C Pre ti ns

1 Hemoglobin determination and white blood cell count every other day Differential if WBC is l ss than 6000 Discon tinue sulfonamides if granulocyt count is l s than 50%.
2 Daily fresh urine f r pH (use nitrazine pape) and sedim nt increase alkali (odium bicarbonate) if pH is les than 7 0 Discontinu drug if red blood cells are found in urine (see above) Incre e urin output if less than 1500 cc pe day or crystall ria occu s (mu t be examined for in a fresh specimen)
3 Daily observation of patient fo drug fever rash jaundice nausea vomiting etc

Contraindi ations to Sulfon mid

1 Hi tory of previous v re rea tion
2 Renal insuffi iency (Very small dos s may be used with caution)
3 Live damage (Proceed with ca tion if ess ntial)
4 Heart fail re (If sulfonamides are absol tely nec ssary substitute potassium bicarbonate for sodium bi arbonate s alkalinizing age t)

PARA AMINO SALICYCLIC ACID (PAS)

Para mino salicyclic a id (PAS) and it sodium salt have been found to e ert considerable tuberculostatic activity Tubercle bacilli resistant to streptomycin may be susceptible to PAS and vice versa The imultaneous admini tration of PAS and streptomycin delays th emergen of strains of tubercle ba illi resistant to the latt In addition to the bacteriostatic effect a ntipyretic activity is pres nt

PAS is absorbed readily from the ga trointestinal tra t Peak serum concentrations are reached in 30 to 90 minut s and minimum levels are again rea hed in 4 hours PAS may be administ red in travenously and subcutaneously

Dosage

A Oral 2 to 3 Gm (30-45 gr) every 4 hours
B Intravenous 12 Gm in 3% solution given in 2 dose 4 hours apart 5 mg of heparin should be added t ach lit r

T ity

Na sea vomiting dia rhea drug fever dermatitis crystal luria hematuria and hypoprothrombinemia may be observed Ga trointestinal symptoms may frequently be avoided by parenteral administration of sodium PAS

6 1 ravenous Flui s

Const tuents	% Sol	Gm per liter	mEq /lit r of Ion N +	K	C +	Cl
N C	0 85	8 6	145			145
KCl	0 03	0 3		4		4
C Cl)₂	0 033	0.33			6	6
T t l			145	4	6	155

B Conc ntrat of Pota ium, Magnesi m, Cal i m (KMC*) (To be dded to half isotonic or more or entrated fluids) Contain 25 mEq K 10 mEq Ca^{++} 10 mEq Mg 45 mEq Cl /10 cc am u e or

KCl 1 8 Gm
$MgCl_2$ 43 Gm } in 10 c
CaC_2 55 Gm

5 tions of Mi d El trolyt s Yi lding Fr Bas

L Ca l where b and pot ium repl ment is required simultaneously

A Low Potas i m, Low Free B s Lactated Ringer s Solution U S P Compound In ction of Sodium Lactate B P (Hartmann s) (isotonic)

Const tuent	% Sol	Gm per lit	mEq /lite of Ion I	K	C	Cl
N Cl	0 6	6 0	1(			102
KCl	0 03	0.3		4		4
CaCl	0 02	0			3.5	3.5
Sod l ctat	0 3	3 0	27			
Tota			1,)	4	3.5	109.5
Fre Na			27			

B High Pota sium High Free B s Darrow s s lution (KNL) (otoni)

Constituent	% Sol	Gm per lit	mEq /lit r of Ion Na	K	Cl	Lactate
N Cl	0 4	4 0	70		70	
N l t te*	0 6	6 0	53			53
KCl	0 27	2 7		35	35	
T t l			123	35	105	53
Fre Na			53			

C Vario int rm di t ol tion ontaining l s K^+ and less free b s are also a ailabl [g G stric Electrolyte Solution With 10% D xtrose (Baxter)] isotonic

Constituent	% Sol	Gm per lit r	mEq /lit r of Ion Na	K^+	Cl	Lactate
N Cl	0 51	5 1	88		88	
KCl	0.09	9		12	12	
S d l tat	0.56	5.6	50			50
De trose	(10)	(100)				
Total			138	12	100	50*
Free Na			50			

Sodi m lactate is equi le t to free base

S ition of M x d E ectrolytes Yi lding Fr   A 12
 [Gastri El ctr yt S   tion with 10% De trose (Butl r)]
t ston

I   To repl c exc   ve Cl losses plus (eq ent small r loss s of Na and K+

Constit nt	% S I	Gm per lit	mEq /lit			of ion
			N +	K+	NH4+	Cl
N Cl	0 37	3 7	63			63
KCl	0 13	1 3		17		17
NH4Cl	0 [illegible]	[illegible] 7			7	20
De t se	(10)	(100)				
T al			63	17	70	15
E Cl						73

Sp al d Balan ed Ele tr lyt S l tions
 H   tly   l ran ,   t   h ve be n d attributi g so cal d b lanc d el trolyt s l tions f r m Int an   th   apy   They loo ly simulate th elect o yte cont t f g astr   e   pt fo slight ly higher pota s m   Their al e t q ation bl   however be s s body los   s of elect olyt s d not f llow th pa t rn of   rum on   tr tion   I th p e   nc of goo l r   a function it i doubtful that the alled bas c el trolytes ar e sential   Th y ha   o alue as   re Il e ag nts a d may be h mful i s m disea e state (g metabol c alkalosis)

ROUTES OF ADMINISTRATION FOR ELECTROLYTES

I.V. Admi i t tion
 It I most import nt to e e ci   g   t   e in administ ation f I V s lutions   inc th se it e e t e ellula fl id con   nt at ons rapidly   This is spe ially tr e when giving K and Mg salts which are exc ed gly to ic
 In th p es nce of n rmal r nal and re piratory m hani ms when swallowing is possible the oral administ tration of s lts is pref   ed

Or l Admi i tr ion
 When ral alts a   administer d usually th n gative ions not too important   S   p ge 33 for th commonly us d salt

PARENTERAL FEEDING AND FLUIDS

 Wh n o al f ding s   impr ti al th pare t   l route th m thods of ch i

HYPODERMOCLYSIS

 Hypodermocly is is the subcutan ous administration of la ge quantities of isotonic s l tions   ally physi l gic l s l   r dex t os in w te or s line Administ r at r t of 50 503 c (1/2 1 pt)

 Ammonium chlorid is q iv l nt t f e acid

per hour by use of 1 needle or 500 1000 cc (1/2 1 qt) per hour with 2 need s Usual practical maximum is 3000 4000 cc (3 4 qt) per d y Care must be taken to avoid overdist nding the tissue This can cause avascularity which may lead to tissue necrosis When gi ing glucose solutions 2 1/2% in half normal saline is preferred 5% may be given in water but not to debilitated elderly patients *Never give in concentrations over 5% glucose to any patient*

To facilitate absorption hyaluronidas may be used 250 vis cosity units are used per 500 1000 cc of fluid The material may be injected into the tubi g of the hypodermoclysis s t into the site of insertion of the need es or may be dissolved in the solution The rate of fluid absorption i increased up to about 12 times

VENOCLYSIS

The intravenous i the route of choice for extra alimentary ad ministration of fluids and nutrients Fluids lectrolytes gl cose and protein can be administered by this method The following are the normal requirem nts

W te

The only way water can be given I V without electrolyt s to supply the obligatory ne ds of the body is as a solution of 5% or 10% g ucose or fructose in distilled water NEVER administer plain distilled water I V Prot in hydrolysates may contain significa t quantities of electrolyt s (NaCl usually) and the end products give rise to urea (see page 12)

El ctrolytes (Min rals)

A Sod um Sod um chloride (NaCl) is the most important electro lyte Average daily intake is 3 to 5 Gm (45 75 gr) Average daily requirements 500 1000 cc (1 pt 1 qt) of physiological (0 85 0 90%) saline If conditions leading to excessive NaCl loss are pres nt added salt may be given Otherwise do not give over 1 liter (1 qt) physiological saline (8 5 9 0 Gm) daily

B Pota sium If parenteral therapy is to be continued for over 3 to 5 days one should supply more complete electrolyte re placement especially potassium loss s Aver ge daily basal potassium requirement is about 2 to 4 Gm of KCl (25 50 mEq of potassium) This may be done by use of solutions containing potassium or by adding potassium chloride to saline or glucose (see page 25) *Potassium solutions must be administered slowly (-5 mEq /liter of K+ in -3 hours) Never ad- minister potassium I V in the presence of poor renal function*

Glu ose

May give as 5% or 10% sol tion Preferably dministered in distilled water but may be given in saline Never give more rapidly than 0 8 Gm per Kg (1 dr /10 lb) per hour this is ma imum rate of utilization When given more rapidly than this glycosuria and concomitant fluid loss usually result In cases where caloric need is great and fluid restriction is n cessary more concentrat d glu cose (20 50%) may be given I V very slowly

3 vert S r

Eq l parts glucose and fructose have recently be n shown to be utilized somewhat more rapidly than gl cose and so an be ad minist red more rapidly The diff rence how ver is not m rk d

P ot i

A Am o A id Usually given as Protein Hydrolysat s N N R and usual y administe ed as 5 5% sol tion (us ally in 5% glu cose in di til ed wat r) Higher conce tration of protein may be us d but the l tion is then often too thick or irrit ting Solution must be admini t red slowly about 1 lit r (1 qt) in 2 hours The mat rials are prepared with va ying electr lyt concentrations (ome minimal) by diff rent ompani s and the concentration should be checked if electrolyte restriction is important

1 Definite ontraindications to intravenous protein hydrolysat (Elman)
   a Solution which has been open fo sever l hours or is not ryst l cl r should not be used
   b Untoward r action of all rgic type Urtic ria angio neurotic ed ma kin rashes (Tran) m na sea or vomiting re not contraindic tions Nausea and vomiting re usually due to too rapid administration of the prot in hydrolysate)
2 Questionable cont aindications Postoperative anuria

B Citrat d Norm l H m Pl m , U S P , has about 7% p otein It i an exc llent sou e of prot in wh ich an be administered fr ly Plasma conta.ns sodium chlo ide in the same conc n t tion s physiologi al s ine so limit usually is 1 lit (1 qt) per day The prin ipal di advantag s of plasma are the danger of prod cing homologous s rum jaundi e (even if tre ted by ultraviol t irradiation) and the high ost of the mat rial

C Norm l H m Serum Albumi , U S P , or Salt poo S rum Albumin An ex ellent source of p otein 25 Gm albumin per 100 cc solution is equiv lent in osmotic pre re to 500 cc of plasma This is an excellent way to administ r prot in in a m ll fluid v lum and with low salt intake by giving the salt poor materi l Albumin is very expensive

Gen ral lnad qu y of Intravenous Alimentation

A oon p actic l, or l feeding should be started. It is us ally impossibl to administer adequate calories by intravenous means The f llowing chart outlines the general pr ctical d ily physiol gic l limits of intr venous alimentation The principal limiting f ctor i the fluid intake The administ ation of 3000 cc of 5% protein hydrolysate in 5% glucose solution would give the follow ing amounts of fluid electrolyte and nutrient material

Fl id	Mine al (as N Cl)	Glucose	Protein Hydrolys te	Calori
3000 cc	Up t 6 0 Gm	150 Gm	150 Gm	1200

E c Gm prot in hyd olysate m y ont in up to 2 Gm NaCl although most produ ts now ontain les N

Chapter 3

GENERAL SYMPTOMATIC TREATMENT

TREATMENT OF CONSTITUTIONAL SYMPTOMS

PYREXIA (Fever) (code No 003)

Measures specifically dir cted toward depression of an elevated body temperat re per se are usually not indi ated except fo high and prolonged fevers

A R moval of the Specific Ca e of the Fever
 1 I f ctions See ind f r specif c d s ses
 2 Dr gs or chemicals Many drugs (e g sulfonamid s) are capable of inducing febrile reactions
 3 Dehydration Provide ad quate oral or parent ral fluid
 4 Impairment of C N S heat reg lating center This poses a d f icult ther peu i problem Provide f r opt mal oxyg na tion and hydration of tiss s and prevent excessive hyper thermia by artificial m asures if indicated (see below)

B R duction of th Fe r by Nonspe if M an When th body t m perat re is g eater than 40° C (104° F) particularly if pro onged the following measures may be utilized
 1 Increased fluid intak By oral or parenteral routes
 2 Warm alcohol sponges Cooling i due to evaporation
 3 Warm or tepid baths These c use periph ral vasodilatation
 4 Cold sponges I rovid pro npt cooling of skin and psycho logical rel ef but interfere with heat los
 5 Ice bag Provide local comfort e g for he d che
 6 A tipyretic drugs Quite eff ctive in reducing fever and ha e a simultaneous antipyretic and analgesic eff ct They h ve the disadva tage that th y obscure the clinical picture and may ca se und sirabl side effects such as diaphoresis skin eruptions hematologic changes na sea and vomiting cardiovasc lar d pres ion etc Such drugs th refore are to be employed cautiously in inf ctious fevers and are pref e ably not used in the enteric fevers (e g typhoid fever) The following a tipyretic drugs adminis red every 4 ho rs p r n are among the most commonly used and are probably least apt to produce untow rd reactions
  a Acetylsalicylic acid (aspirin) 0 3 0 6 Gm (5 10 gr)
  b Sodi m salicyl te 0 3 0 6 Gm (5 10 gr)
  c Acetophenetidin (ph naceti) 0 3 0 6 Gm (5 10 gr)

SHOCK (Circulatory Failure or Collapse)
(code No 0x8)

Shock is complex and as yet incompletely understood clinical syndrome of peripheral circulatory failure. Numerous pathophysiological mechanisms are involved in the production of shock, such as lack of effective blood volume, failure of myocardial function, loss of peripheral vascular tonus, increased capillary permeability, failure of blood oxygenation mechanisms, and alteration of the physiochemical characteristics of the blood. The principal types of shock may be defined clinically

A. Primary Shock (Immediate Shock or "Collapse"). This form of shock consists of ... of the ... which follows relatively ... after certain ... factors not ... those of ... rogenic or psychogenic origin. Although shock responds quite promptly to simple supportive measures, it is important to remember that primary shock may proceed insidiously into the more serious secondary shock. Careful ... of the patient and correction of the aggravating factors are essential. Some of the more common causes of primary shock are

1. ... ic and psychogenic factors ... of stimuli ... frig... unpleasant sights, ... odor
2. ... Due to an ... acute ... chronic illness ... This ... most frequently ... patients ... postoperative
3. Certain drugs, e.g. nitrites and local anesthetics

B. Secondary Shock (Delayed, Prolonged or "True" Shock). The onset of this form of shock may be ... insidious. The ... signs of cold, pale or cyanotic skin ... (... r 100) and arterial hypotension, although ... may appear suddenly and ... very often ... fully develop ... shock. Unfortunately ... shock ... often refractory to ... the most vigorous ... shock therapy. Early ... of shock is imperative. The possibility that shock may occur must always be anticipated. In addition to the above mentioned ... of shock (primary), secondary shock may ... from any of the following

1. Loss of blood (internal or external)
2. Loss of plasma into the serous body cavities (peritonitis)
3. Loss of plasma into ... (crush ... burns ...)
4. Trauma ... severe
5. Adrenocortical insufficiency
6. Dehydration
7. ... overwhelming infections (e.g. septicemia)

Treatment of Shock

A. ... rapidly. Therapy of shock will ... with the physiopathological changes which have occurred and which are responsible for the state of shock. *Restoration and maintenance of an effective blood volume is the primary emergency measure in combating shock.* Dehy... diminished blood ... hypoxia, ... anemia, infection, hypoproteinemia, acidosis, ... and other physiological abnormalities may require specific treatment

1 Body position Place patient in the "shock position" (see page 31) unless he has a head injury
2 Maintain an adequate airway
3 *Body warmth Keep the patient comfortably warm* Avoid chilling or excessive externally applied heat since this will *further dilate the peripheral vess ls*
4 Pain Control pain (particularly if severe) promptly by the use of appropriate first aid *measures and analgesic drugs* Give morphine sulfate 10 30 mg (1/6 1/2 gr) subcut for pain but remember that subcut absorption is poor in patients in shock In case of severe pain morphine sulfate 10 15 mg (1/6 1/4 gr) I V may be used to great ad vantage *Do not give morphine to unconscious patients pa ients who have head injuries or those with re piratory depression*
Avoid overdosage with morphine substitute barbiturates and *salicylates for sedation and analgesia* whenev r possibl
5 Allay apprehension by reassuring word and action Pento barbital *sodium 0 1 Gm (1 1/2 gr) orally or 0 13 Gm* (2 gr) subcut or by rectal suppository may be of value
6 Parenteral fluid therapy *Replace and maintain adequate blood volume* Need for this may be obtained by the history vital signs and hematocrit studies The clinical determi *nation of effective blood volume is difficult however and is* sub ect to considerable variation There is no single technic or rul upon which to judge the fluid requirements *Response to thera y is a valuable index*
   a Saline or glucose solutions Give *immediately* 500 cc physiological saline or 5 10% dextrose solution or *200 cc of 5% physiological saline solution (may be given* rapidly I V while making preparations for plasma serum albumin or whole blood) Plasma serum albumin and whole blood exert a more s stained increase in blood volume through the colloidal o motic pressure effect than do dextrose or electrolyte solutions
   b Plasma or serum albumin Any of the v rious plasma preparations such as dried or frozen plasma or serum albumin may be employed depending upon their avail ability *Plasma is most readily procurable may be* rapidly set up for administration and does not require *preliminary blood typing The quantity of plasma to be* given depends upon the stage of shock and the response to therapy based upon both clinical and laboratory studies
      (1) Impending shock Administer 500 cc plasma imme diately and follow closely clinically and with hematocrit studies to determine need for f rther plasma
      (2) Early or advanced shock Administer 500 cc plasma *immediately and repeat* with 500 cc *every half hour* up to a total of two liters depending upon clinical *course and hematocrit findings* If shock persists following such therapy the prognosis is very poor
   c Whole blood If plasma is unavailable or if anemia is present whole blood may be administered as needed
   d Plasma expand rs Evidence d ring the last few years supports the view that there are several effective plasma

substitute for em rgency tre tm nt of shock These
ge ts have high molecular weights high oncotic pres
sures and the nece sary vi cosity They have the added
advantage of not causing infectious h patitis

(1) Prot ins e g gelatin 5 6% solution
(2) Carbohydrates e g dextran 6% s l tion
synthetic polysaccharid
(3) Synthetic polym rs e g polyvi ylpy rolidine
(P V P macro e) a 3 5% in Ringer's sol tion

7 Vasopr or drugs Thes agents are mo t effective in
hypot nsive shock without associated d creas in blood vol
ume (g spinal an sthe ia syncope acute intoxication)
although they may be employed in seve e shock due to any
c use

a Levarterenol Bitartrat N N R (Levophed®) Considered
to be very ffectiv but great are must be u d to avoid
ext s ation The drug is be t gi n by conti ous I V
infusion of a sol tion cont ining 4 16 mg of art renol
dil ted in one liter of 5% dextrose The initial sol tion
should contain 4 mg pe lit
If a rapid flow is necess y to p od e ad quat ele
vation in p essure Th flow of rterenol i controlled
so that 20–40 d op per minut may be given to stabiliz
the blood press re at the required l vel without adminis
t i g too la ge a total fluid vol me Aft several hour
the flow may be red ed gradually to d termine wh ther
it is ne sary to contin th drug The inf sion has
been used effectively in som pati nts fo a number of
days with a significant red tion in mortality from hock

b Ph nyl phrin hydrochlorid (Neo ynephrin Hydro
chlorid ®) 0 5 mg I V or 5 mg I M repeated in an
hou if necessary to m i tain the blood pre sure o by
I V inf ions of 100 150 mg pe lite of 5% gluco in
w t gi en slowly cont lli g the rate of administr
tion by the response of th patient

c M phent rmine (Wyamine®) 5 20 mg I V gi en 1 mg
per min te by contin ous I V inf sion o 15 20 mg
I M repeated in 30 60 min tes as e ded to maintain
the systolic pre e t 100 mm Hg or in p eviou ly
hype t nsive patient at 120 mm Hg

B Specific (Defi iti) M as es

1 Anoxi (hypo ia) Anox a is p obably p sent as a p i
mary o complicating fa tor in all types of shock ther f re
administration of oxygen m y be onside d f most
patients in shock In som pati ts in shock oxyg m y be
i di t d for oth r r s s (cardi c f ilu e p eumonia tc)
Howev th pati nt in impe ding hock is app hensive
and th oxyge m k o tent som tim may serve to in
cre se his appreh nsion

2 Acid is Not freq tly ncounte ed wh n lini l and
laboratory data indi t coexist t a ido is tre t with p
propriate intra o s fl ids (pag 20)

3 Dehyd tion Administ 500 1000 c of phy i logi al
saline o 5% d xtro e sol tion I V o by hypod rmocly is
as n d d As oon as patient can wallow giv fluids b

mouth. Unless there is *specific clinical or biochemical evidence of sodium deficiency*, avoid administration of more than one liter of physiological saline on the first day. Subsequent parenteral fluids may be given as dextrose solutions. *Follow the principles of fluid administration mentioned on pages 10-13.*

4. Adrenal cortical failure. Adrenocortical steroid therapy has been found to be effective in shock-like states associated with serious medical emergencies. Although treatment is most specifically applied to shock of Addison's crisis, it may also be of spectacular value in certain acute allergic emergencies and overwhelming intoxications. Hydrocortisone (free alcohol or infusion concentrate for I.V. use), 100-150 mg. diluted in 1000 cc. 5% glucose or saline by slow I.V. drip.
5. Cardiac failure. Digitalis and other treatment for cardiac failure are indicated only for those patients with pre-existing or presenting evidence of cardiac failure (see page 182). Digitalis is of no value in shock due to any other cause.
6. Infection. Immediate measures should be taken to combat infection if present. Overwhelming infections are capable of producing sufficient metabolic changes in the body tissues to predispose to shock. Prophylactic use of antibiotic drugs *in pre-shock or shock patients who are potentially threatened* with severe infection (e.g., burn patients) is recommended.
7. Hemorrhage and anemia. Although plasma is usually given *as an emergency measure in shock complicating hemorrhage*, acute anemia must be corrected by replacement with whole blood to prevent hypoxia. The quantity of whole blood to be given will depend upon hematocrit studies.

C. <u>Evaluation of Emergency Therapy</u>. *Constant observation of patient is imperative.* The pulse, respiration, temperature (rectal), and blood pressure should be evaluated immediately and every 15-30 minutes or oftener thereafter until there is definite improvement of the peripheral circulation.

1. Rapid recovery. If vital signs return rapidly to normal, keep patient under close observation but withhold further anti-shock therapy. Check vital signs every half hour. Perform hematocrit studies if there is any suspicion whatever that secondary shock exists. Remember that hemoconcentration usually precedes blood pressure and pulse changes. After eliminating potential or existing shock-producing factors, the patient may be managed expectantly until it is reasonably certain that danger has passed.
2. Prolonged recovery. If the vital signs remain abnormal for even a brief period after initial measures, or show evidence of further progression of peripheral circulatory failure, institute further vigorous anti-shock therapy. Blood hemoglobin, RBC, and hematocrit should be determined immediately for a base line, and should be repeated as often as necessary to evaluate the results of therapy.

INSOMNIA (Sleeplessness) (code No 916)

Insomnia is eith r a f ilure to f ll asleep frequ nt awak ning from sleep or inability to remain asleep for normal period Individ al sleep requi em nts how r may vary gre tly d pend ing upon health physical activity traini g etc The cau s of in somnia are multiple Emotional or m nt l pr occ p tion is th common t aus of persiste t in omnia

A P ychoth apy Direct m sur s tow rds corr ction r all i t on of iating an i ti s (s p g 42) M s le relax tion t hni and physical th rapy methods could be includ d und r the heading of p lliative psy hotherapy

B General M e r e

1 Pr motion of optim l g n r l he lth
   a Easily digestible foods in re sonabl quantiti s
   b Treatment of existing syst mic dis a e
   Adequate rest r creation v tions and e er is
2 R lief of annoying symptom which int rf r with sl p
   a Pain (all type) d Py osis g Na al ob tru tion
   b Prurit s e Diar hea h Dy p a a d orthopn a
   c N us a f Cough i U inary distu ban
3 Quiet p e bedtime tivity R st i tion of exciting a t viti s e peci lly in the pre bedtime period is an individ al m tte It is probably advisable for susc ptibl individuals to oid iting or thought provoking r ading games d ama or movi s for a period of 1 2 o mo hou bef re bedtime En ou ge light r ading and other on iting a tivitie
4 Re t iction of tim l ti g be ag s and drugs spe ially afte 5 00 p m e g t a coffe toba o phed ine like drug and amphetamin compounds
5 P vision of adequ te sleeping faciliti s e g a omfortabl bed and a qui t and dark room with s itable ve tilation t m pe at re and humidity
6 W rm bath before bedtim m y h ve a rela ing ffe t
7 W rm milk tak n t bedtim m y lso have a rela ing eff t

C Hypnoti Ag ts Th routine us of hypnotic drug to contr l insomni is not only imp oper b t m y also be d gerous because of h bitu tion d lirium dang r of f lling from b d etc The following ag t m y be us d in a co da ce with individual n ed

1 Wine (sw t sh rry or simil) 60 (2 o) o ally at bedtime
2 Whi k y 30 cc (1 oz) dilut d with w t r o ally t bed time
3 Phe ba bital U S P Phenobarbiton B P or lly has a l w (30 60 minute) ction and e erts a p olong d ff ct (6 8 h u s) and pati t is pt to ha a hangov It i cr ted by kid y and i the efor cont aindi ted in n l insuffici y
   a Phen ba bit l U S P Phenob bitone B P 0 1 0 2 Gm (1½ 3 g) o lly h s p n
   b Ph barbit l Elixir U S P 16 32 cc (4 8 dr) t in 16 mg per 4 c ally h p r n
   c Ph b bital Sodium U S P Ph ob bito B P 0 065 0 1 Gm (1 1½ gr) as 10%
   n

4 Pentobarbital Sodium U S P Pentobarbitone Sodium, B P orally has a more rapid eff ct (15 30 minutes) and *shorter duration of action* (4 6 hours) than phenobarbital It is excr ted by the liver and is therefore contraindicated in hepatic insufficiency
   a Pentobarbital Sodium U S P *Pentobarbitone Sodium* B P 0 1 0 2 Gm (1½ 3 gr) oral y h s p r n
   b Pentob rbital Sodium Elixir (N C A) 16 32 cc (4 8 dr) contains 20 mg per 4 cc orally h s p r n
   c Pentobarbital Sodium rectal suppository (N C A) 0 13 Gm 1 2 inserted rectally h s p r n
   d Pentobarbital Sodium Sterile U S P 0 5 Gm ad ministered as a *freshly prepared* 5% solution, I M or I V (slowly and not more than 1 cc per minute)
   Toxic reactions to barbiturates include excit ment and deliri m (especially in children and in elderly debilitated or febrile patients) drug addiction barbiturate dermatitis circulatory depression, and respiratory depression
5 Chlor l Hydrate U S P B P (12 5% Sol) 2 4 cc (0 25 0 50 Gm) orally h s p r n
6 Sodi m Bromide Elixir N F (17 5% Sol) 1 2 dr h. s p r n
7 *Paraldehyde U S P B P A useful agent since the clean* stock solution is sterile and can be used for oral rectal I M or I V administration as needed The drug has an unpl asant odor It may be used in d lirium
   a Oral 4 16 cc (1 4 dr) in cracked ice with milk fruit juice or whiskey
   b Rectal 16 32 cc (4 8 dr) in 30 60 cc (1 2 oz) of a vegetable oil (i e 2 1 dilution)
   c I M 5 10 cc (1 2½ dr) (Preferably deep in buttocks)
   d I V 1 2 cc (15 30 ℥) very slowly *CAUTIO May cause respiratory arrest or pulmonary edema*

PAIN (General Aspects) (code No 518)

Concepts of pain and pain mechanisms are highly controversial and for that reason all classifications of pain remain quite arbitrary *For practical purposes there are two principal types of pain* super fici l and deep Pain is sharply localized in superficial structures and diffusely or poorly localized in deeper structures Deep pain may result in referred pain Pain may occur as a result of multiple types of stimuli acting upon the various body structures The relief of pain may be achieved by removal of the stimul s or neutralization of the effects of the stimulus and when these are not *feasible* by dulling or obliterating *the sensation of pain*

Analg sic Drugs

D gs which dull or obliterate pain without producing loss of consciousness (cf narcotics)

A *S licylat s The most commonly used of the various analgesics* and fr quently employed for self medication
   1 *Actions and I dications They are antipyretic analgesic* antirheumatic and uricosuric in action and are useful in

relieving myalgias neuralgias arthralgia h adach s and dysm norrhe

2 Preparations dos ge and admini tration are as follows
   a Acetylsalicylic Acid U S P B P (aspirin or A S A) plain o enteric-coated 0 3 Gm (5 gr) tablets Ordinary dosage is 0 3 0 6 Gm (5 10 gr) e ry 4 ho rs p r n 0 3 Gm (5 gr) every 2 3 hours is stated to be more effective and results in f wer untoward r ctions than larger dos s at l ss frequent intervals The plain p eparation m y cau e g stric distre s thi m y be avoid d by administration of th drug on a f ll stomach or with 1/2 1 tsp of baking sod o oth r antacid The ent ric preparation is slow r a ting but it p events g stric i ri tation and is also useful f r thos p tients wh might be skeptical of the analg sic valu of ordin ry a pirin In certain cas s it may be ne essary to administer the powdered a pirin rectally in a thin st rch paste
   b Sodium Salicylate U S P B P plain or e teric coated, 0 3 0 6 Gm (5 10 gr) ev ry 4 hours p r n
   c Ac tylsali ylic a id compound (aspirin compound or A P C), a syn rgistic combin tion
      ℞ Acetylsa licyli a id 0 22 gr iiis
      Phenacetin 0 16 gr ii s
      Caffein 0 032 gr s
      Sig 1 2 t bl ts every 3 4 hours p r n
   d A pirin and cod ine prepa tions (see below)
   e Analg sic sedative mixtu
      ℞ Sodium salicylate 10 15 ℥ iii iv
      Eli ir of ph ob bital q s ad 120 ℥ i
      Sig 1 2 t p very 4 hours p r n
      ℞ Pentobarbital sodium 0 032 gr ss
      Ac tysalicylic acid 0 32 gr v
      Sig 1 capsul e ry 4 hour p r n
   f Methyl Salicylate (Oil of Winterg n) U S P For external us as a linim nt to sore m s les or joints A 10% preparation in oil o ointm nt

3 Untoward r ction U ually mild consisting of sour stomach and di zin ss but la ge dos s may ca e tinnitus d afness bl rring of ision, nau a and vomiting di rrhea diaphor sis he dache and d lirium In ert in sen itive p ti ts salicylate m y cause rticari s and acute laryng l ed ma

B A etophe tidin U S P Ph nacetin B P 0 3 Gm (5 gr) e y 3 4 h u s m y be empl yed in rtain ca s of salicylate intol rance In gen r l, however this drug is m re t xic than oth analgesic p p rations and p long d use is not advis d Its princip l v lue is in analg sic combin tion (e g A P C)

C Col hicin U S P (see Gout page 321)

Na oti Drug

D ug whi h r liev pain and t the am tim p odu e uphoria leep o tupo Pain relief occurs prior to loss of consciou e s Indic ted for r lief of pain of d gr e gre ter than that by an lge ic or whe p in i of type not u ptibl to ana drugs (e g vis al pain) *All of the following drugs*

names to prescriptions. These drugs should always be discontinued as soon as the need for them is past

A Codeine Phosphate, U.S.P., B.P.

1 Actions and indications. Pharmacologically similar to morphine but of lesser intensity. C.N.S. depression in ordinary dosages but C.N.S. stimulation in higher dosages; diminishes cough reflex; decreases bowel motility (constipating). Preferred over morphine for relief of moderate degrees of pain because it is much less habit forming, is much safer and results in fewer untoward reactions

2 Preparations, dosages and modes of administration

a Codeine Phosphate, U.S.P., B.P. 0.008-0.065 Gm (1/8-1 gr.) orally or subcut. every 3-4 hours p.r.n. Ordinarily if 0.065 Gm (1 gr.) is ineffective for analgesia use stronger narcotics, since larger doses of codeine are attended by untoward side reaction

b Codeine and acetylsalicylic acid (codeine and aspirin)

℞ Codeine phosphate 0.008-0.065 gr 1/8-1
Acetylsalicylic acid 0.3-0.6 gr v-x
Sig: 1 tablet every 3-4 hours p.r.n.

Codeine and acetylsalicylic acid compound

℞ Codeine phosphate 0.016-0.065 gr 1/4-1
Acetylsalicylic acid 0.220 gr iiiss
Phenacetin 0.160 gr iiss
Caffeine 0.032 gr ss
Sig: 1 tablet every 3-4 hours p.r.n.

3 Untoward reactions. Allergic reactions such as urticaria, pruritus, contact dermatitis and even anaphylactoid responses may occur. Addiction is much less apt to follow use of this drug than use of morphine

B Meperidine Hydrochloride, U.S.P.; Pethidine Hydrochloride, B.P. (Demerol®, Dolantin®) 0.050-0.100 Gm (3/4-1 1/2 gr.) orally or I.M. (not subcut.) every 3-4 hours p.r.n. is stated to be especially useful for pain associated with smooth muscle spasm (except biliary spasm) although this is disputed. It may be given to individuals who do not tolerate morphine and is less apt than morphine to cause nausea, vomiting, and respiratory depression. Analgesic effect is less than with morphine, Dilaudid® and methadone. Addiction tendency definitely exists

C Methadone Hydrochloride, N.N.R. (Amidone®, Dolophin®) 0.005-0.010 Gm (1/12-1/6 gr.) subcut. or I.M. every 3-4 hours p.r.n. provides analgesia of a level similar to morphine but is slower acting and has a more cumulative action. It is stated to be especially useful for the relief of chronic pain because analgesic tolerance develops more slowly than with morphine. Untoward reactions to the drug are similar to those due to morphine and the addiction tendency is about the same. The drug is not tolerated well orally

D Morphine Sulfate. This drug remains the most valuable of the potent narcotics for general clinical use

1 Actions and indications. Central nervous system depression resulting in powerful analgesia associated with sedation, euphoria and hypnosis; selective respiratory center depression and dulling or abolition of the cough reflex. It increases intracranial pressure, has marked nauseating and emetic

RELATIONSHIP OF AUTONOMIC DRUGS BY MODE AND SITE OF ACTION

(DFP)

(OMPA)

(DHE 45)

(DHO 180)

p ychotic complaints Rem mber that somatic compl i ts of bizarr character ar fr quently encounter d in both neurosis and psy hosis

1 General behavior Appearan e spe ch, action and attitudes
2 Emotion (m ood) An i ty agitation elation or depression
3 Th ught content I lusions d lusions or hallucinations
4 S nsori m Insight j dgment orientation memory and int llig n

Gen r l Tre tm t

A Tr tm nt of I ychosom tic Symptom Bef re di co ering a i r m g the u of ten on it may be ad is ble to give r li f by treating sympt ms tll p at tie on co plete re l rea unes a w p p e enunes f t ite Rapid res nse to s eati e and anti pa modic drugs may be uti ized to po nt out susc pt bil ty to tr tment and fun tional nature of disease A careful explanation of rati nale of the therapy should foll w using simp e and retandabl t rms A most us f l remedy f r this purpose is
   R Tinct re of B lladonna 10 0 li s
   Elixir of Ph nobarbital q s ad 1 0 0 l
   S g l t p t i d 0 min a

B Planning of Hygienic Living Reg men I ro id f r optimal physi l and l l l um lan to l ital rapid emotional re covery
   1 Insur a equ te nutrition with regula balanced meals
   2 Plan a workab e living s hedule with allowan e for proper ex rcise recreation r st and sl ep

Tr tm t of S tuation 1 N rosi (Acute em tional disord rs d e to und sirab ext rn l str ss s)

A I rmit the p ti nt to v ntilate his complaints Give him the opportunity to tell his troubles (m t l catharsis) Leadi g questions an sa e consid rable time but it is generally better to allow p ti nt to tell his own story

B Help th pati t t correct or allevi te sit ational f ctor
   1 Utiliz help of l g l social ser i e or welfare ag nci s if indi ated Contact family or associates of p tie t wh n necessary to obtain ad litional inform tion and eff t d sir d chang e in environment
   2 Direct advi e a d assistance tow rd simplification of persona problems Chang s in envi onment marital statu occ pa tional status et may at times be impossible and may compli ate r th r than simplify problems Help p tient find his solution but allow him to make his own de isions

C Determine the pati t s reason for his re ction to his situation Sometimes if the p ti nt is assist d in facing his problems ob j cti ely an lt red philos phy or chang in attitude or re son ing towards th s s me problems may m ke his life sit ation more tolerabl

D Utiliz sublim ting (di erting) t chnics E cour g pati t to develop other interests sports hobbies an l skills particu larly when p tient has exc ss of time f r self preoccup t on

E Use kindly attitude R assur nce sugge tio persuasion and even admonition m y be u eful as the case demands Avoid re proaching or arguing with patient

Tr tm nt f Deep se ted N u os (Long standing or chroni motion l d s rde d to internal onflict and u u lly dating back to childhood)

A Re education o re ori ntation t chnics should b rel g t d to train d p ychiatri ts If ch are not vailabl simpl sympto matic and supportiv medical meas r s d ser the gr atest consid tion

B *AVOID*

1 *Avoid* brutally confronting patient with s sal fa to s of n uroti symptoms

2 *Avoid* pr matu e int rpr t tion of p ychiat ic d t

3 *Avoid* ang r toward pati nt be aus of fail re f impro e ment

4 *Avoid* prolongation of p ychi tri study and t atment whe it is vident that ca prog s is unsatisf t ry or d ge ous In s h s s it i b tt r to ef r the p tient to in dividuals more v rsed in psy hiat ic m thod

a Psych an lyti prin ipl s nd t hni may b indi ted

b In in peri d hand p y hi tri medili g m y be fr ught with dang s Ne os re d f i barrier of ymptomati id a and if th s are brok down n motion l l is may be p cipit t d o th p tient may have undu r ntm t tow rd the amine

5 *Avoid* ggr si psy hoth py d ing cut o symptom ti ph e of p ti t s dis ase

Eval ation f th Dep d P tient s Sui id l Risk

Th pat t m t alw ys b g d d s pot tial s i id b t t in attitud s and re pons s iat th docto in det rmining thi po sibility

A Respon to Direct Q stioni g R g rding S i id l Int nt

1 P tie t wh i "al d" h may mmit sui id is not ve y apt to d so

2 P ti nt who f ls th t he d rves to di o th t lif hold n hope is pt t commit s icide Th se p tie t m y think f suicid b t f lly on al th ir thought from the phy ician

B Doct pati nt R lationship

1 If p e t main d p ed in pit of d ctor help p tie t is a poo sui id ri k

2 If p ti t is re u d by doct fter a r on ble visit p tie t is l apt t be i id l

C R tion t P ti nt N m l E i o m t

1 A patie t wh h s withd w fr m r t living is poor sui idal i k

2 Th patient who e n with ff rt co ti s o m l d ily cont t and work i p bably t so apt to be s icid l

D An in of otic sympt ms us lly indi t th t th pati t is not likely to ommit ui id Th e d f si m chanisms

45 Types of Diets

When preparing the food always make the servings attractive to sight, taste and smell, and serve at the proper temperature. The best planned diet is useless unless eaten by the patient.

STEP 3 – CALCULATE THE TYPE OF DIET TO BE EMPLOYED

After having calculated the basic caloric needs in Step 1, use the following table to be guided in the type of diet for the disease in question. Descriptive details of these diets will be found on pages 52 to 5

THE PRINCIPAL TYPES OF DIETS

Disease or Disorder	Diet
Gastrointestinal	
Peptic ulcer	Modified Sippy
Functional disorders	Bland (low residue, soft consistency, non-stimulating)
Gall bladder disease	Low fat and non-gas forming
Liver disease	High protein, high CHO
Constipation	High residue
Cardiovascular	
Congestive failure	Low sodium (salt)
Hypertension	Low sodium (less than 500 mg./day)
Metabolic	
Diabetes	Usually high protein with moderate CHO restriction (see page 55)
Obesity	Low caloric, adequate protein
Weight loss and malnutrition	High caloric, high protein, high vitamin
Renal	
Nephritis	Low but adequate protein *0.5 Gm./Kg. (0.25 Gm./lb.) body weight per day plus total albumin lost in urine*
Allergic	
Food allergy	Special limitation

These diets vary in the number of calories and/or in the amount of one or more of the dietary components. The next step is to calculate these variations.

STEP 4 – CALCULATE THE VARIATION OF THE DIETARY COMPONENTS AS SPECIFIED BY THE DIET

After determining the basic caloric needs and selecting the type of diet, use the following table to calculate the number of calories and the amount of each dietary component for the diet. The remainder of the total calories not supplied by the fixed components of the diet may be made up with unrestricted foods.

VARIATIONS OF DIETARY COMPONENTS

Compone t	A erage Diet	High or I crea d	L w D r a d
C l i (Energy)	Va bl (Step 1 p ge 45)	25 35% m cal ri s than for maint an e	5 7 % les calo i s th n f r maint nan
P t in	1 Gm./Kg (0 5 Gm /lb) body wt./day (See Step 5 below)	2 4 Gm./Kg (1 2 Gm./lb) body wt./d y (300 Gm is bout pper limit)	0 5 Gm./Kg (0 25 Gm./lb) body wt./d y (See not below)
CHO	50% of alo ies CHO	75% or m re of al i s CHO	About 25% of c lo ies as CHO
Fat	About 100 Gm p day	150 250 Gm pe d y	70 Gm or less pe day
Vitamin	S pplied by w ll balanced diet (see page 45)	I as f high vitamin foods o suppl m ts	Not ind t d
Min rals			
Sodium	5 20 Gm./d y	Above 20 Gm./d y	0 2 2 0 Gm./d y
Cal i m	0 1 1 5 Gm./day	Abo 3 Gm./d y	0 2 0 5 Gm./d y

Not If c l ie ar bundant the prot in m y go s low as 0 3 Gm./Kg (0 15 Gm./lb) body wt pe day

Having f rm lated th di ta y prescription (Steps 1 4) p pare the act l diet by s l ting foodstuff f om th tabl s in Steps 5 6 7 8 d 9 on the f llowing p g

Th se food t ffs m st not only provid th d sired diet ry components but mu t also be m de to fit th c loric sp ifi tions B use of the very s ti l rol of p ot i in th di t s w ll s the highly v riable f t cont nt of the protein food it i ad i ble to begin th di tary lection with p otein food The CHO f t and tot l aloric as w ll as th p otein valu f the variou foodstuffs m t be kept in mind

STEP 5 – DETERMI THE PROTEIN NEED AND ELEC FOODS TO BE USED

P oteins a e ece y for growth d l pm t ti ue r p i and as a sour e of gy On Gm f p otein 4 Calories 100 Gm of p otein during its t boli m m y yield bout 58 Gm CHO

RECOMMENDED DAILY PROTEIN ALLOWANCES (N R. C 1953)

	Am unt pe unit of body w ght	
1 Ad l ts	1 5 2 0 Gm /Kg	0 7 0 9 Gm /lb
2 Ad lts	1 0 Gm /Kg	0 5 Gm /lb
3 P gnant wom	1 5 Gm /Kg	0 7 Gm /lb
4 Lact ti g wom	2 0 Gm /Kg	0 9 Gm /lb

M t of the prot in r qui em ts will b obtain d f om high prot in f ods which f rm th ba is of the p ot in int k l l tion Aft r det rmining the mount of p otein ed d f the di t s lect the high p ot in f od by th use of the tables on the f ll w ing pag

HIGH PROTEIN FOODS

These proteins are interchangeable in the diet. One serving yields about 6 Gm. of protein, however, the total caloric content varies.

Food	Serving	Protein		CHO	Fat	Total
		Gm	Cal	Gm	Gm	Cal
Egg	1 small	6	24	0	6	75
Milk skimmed	1 cup or glass	6	24	10	0.6	65
Milk whole	(200 cc)	6	24	10	8	130
Lean meat or fish	1 oz (fresh)	6	24	0	5	70
Fatty meat or fish	(30 Gm)	6	24	0	7	80
Fresh fowl	1 oz (30 Gm)	6	24	0	2	40
Cottage cheese	1 rounded Tbsp	6	24	1	0	30
American cheese	1 slice (1 oz)	6	24	0.5	8	100
Fresh navy beans	1/4 cup	6	24	2	3	60
Other legumes	1/2 cup	6	24	1.5	1	100
Nuts	1 oz	6	24	3	16	200

RELATIVE PROTEIN VALUES OF PROTEIN PORTION OF DIETS

Diets of more than 70 Gm. or less than 40 Gm. of protein can be calculated by either adding or dividing these basic portions. The table below is so arranged that proteins for low caloric (low fat) and normal or high caloric diets can be selected.

PROTEIN PORTIONS OF DIETS

For Low caloric (Low fat) Diet	Cal.	For Normal or High caloric Diet	Cal.
Yields 40 Gm. or 160 Cal. protein			
1 Egg	75	1 Egg	75
2 Cups skim milk (400 cc.)	130	2 Cups whole milk (400 cc.)	260
3 1/2 oz. meat (lean)	245	3 1/2 oz. meat (med. fat)	315
	450		650*
Yields 50 Gm. or 200 Cal. protein			
1 Egg	75	1 Egg	75
2 Cups skim milk (400 cc.)	130	2 Cups whole milk (400 cc.)	260
2 Tbsp. cottage cheese	60	2 Tbsp. cottage cheese	60
3 1/2 oz. meat (lean)	245	3 1/2 oz. meat (med. fat)	315
	510		710
Yields 60 Gm. or 240 Cal. protein			
1 Egg	75	1 Egg	75
2 Cups skim milk (400 cc.)	130	2 Cups whole milk (400 cc.)	260
1/2 Cup cottage cheese	240	1/2 Cup cottage cheese	240
3 1/2 oz. meat (lean)	245	3 1/2 oz. meat (med. fat)	315
	690*		890
Yields 70 Gm. or 280 Cal. protein			
1 Egg	75	1 Egg	75
2 Cups skim milk (400 cc.)	130	2 Cups whole milk (400 cc.)	260
1/2 Cup cottage cheese	240	1/2 Cup cottage cheese	240
5 oz. meat (lean)	350	5 oz. meat (med. fat)	450
	795		1025

Total calories represent the caloric value derived from the carbohydrate, fat and protein content of the foods listed.

STEP 6 – SELEC" THE CARBOHYDRATE FOODS FOR "HE D ET

Carbohydrates supply energy and usually constitute the la gest part of the diet (about 50%) One Gm of CHO 4 Cal If ad quat CHO are given th proteins are p red a sou c s of e gy At least 10 15% of the diet must be CHO to prevent ketosis

A For ough app xim tion of the CHO content of foods the fol l wing f gu s will uffice An average se ving is pproxi m tely ½ cup ooked o 1 cup raw veg t bles o fruits

Average S ving	Am unt of CHO	Total Calo ies
V g t ble	4 8 Gm	25
Fruit	12 15 Gm	50
Slice b ead pot toes c bean c re l	15 20 Gm	75

B For clos approxim tion of the CHO content of food

1 5% g t bl and f u ts 100 Gm portion yield 3 7 Gm CHO 1 Gm protein, and appro imately 25 Calorie

Asp ragus (6 stalks)	Cucumbe (20 sli e)	Spinach (1 c)
Bamboo hoots (3/4	Egg plant (2 slice)	String beans (1)
Bean sprouts (1)	Endive (1 h ad)	ummer quash (1 c)
Be t gr s (1 c)	Lettu e (1/3 h ad)	Tom to (1 sm ll)
B occoli (1 c)	M st rd g ns (1 c)	Turnip g ens (1 c)
C bbag (1½ c)	Okra (10 pods)	Cantaloupe (1/4)
C uliflow r (1 c)	Pepper gr (1)	Rhubarb (1 c)
Cel ry (5 st lk)	R dish s (15)	Str wb rries (12)
Ch rd (1½ c)	S uerkr ut (2/3 c)	Waterm lon (½ slice)

2 10% veg tables and fruits 100 Gm po tion yields 8 12 Gm CHO 1 Gm protein and approxim tely 40 Calori s

Artich k (1)	Onions (2)	Gooseber i s (2/3 c)
Be ts (2/3)	Pumpkin (1/2 c)	Gr p f uit (½ c)
Carrot (1 l g)	Rut b g s (3/4 c)	Honeyd w m lon (1/10)
Dand lion gre (1 c)	White t ips (3/4 c)	Orang (1 c jc)
Gr beans (1 c)	Winter squ h (1 c)	P h (1 large)
Leek (4 stalks)	C anberries (1)	Tang ines (2)

3 15% veg tables and f uit (fresh or cann d without sug) 100 Gm portion yi lds 12 17 Gm CHO 1 Gm p otein and approxim t ly 50 C lo i s

Appl (1 m d)	Curr nt (1)	P (3/4 c)
Ap i ots (2)	G ap s (1 c)	Pineapple (2 lic s)
Bl kbe i s (1 c)	Loganbe ri s (1 c)	Pl m (3)
Blu be i (2/3 c)	N ct rin (2)	R pbe i s (1 c)
Ch r i s (18)	P ar (1)	

4 High CHO foods Ser ing yi lds app oxim tely 75 100 Cal

a ½ c p of c als macaroni l gumes corn (l o yi ld 3 5 Gm p ot in)

b ½ cup of parsnips and potatoe (lso yields 1 Gm p ot in)

c 1 li of b d (lso yield 2 Gm p otein)

d C k o quival t (lso yi ld 2 Gm p otei)

(1) 4 od (3) 5 p t l

(2) 3 graham (4) 3 Ry kri p®

e Dried fruits ¼ cup raisins 3 or 4 large prunes or dat e 1 2 larg figs (also yields 1 Gm protein)
f Sugar 3 cubes or 2 he ping t aspoon s.s

C Caloric Values of Bever ges (For mi k see page 48)

	C l /oz (1)		Cal /oz (1 c)
T coff e	1	[illegible]	12
T a	0	Dry wine	5
[illegible]	15	Sw t wine*	45
Ci ger a e	12	L iquor	75

Ca [illegible] d rived mainly from a [illegible]

[illegible]

Th f t r quirements of the body are unknown but f t forms an important source of food 1 Gm fat 9 Cal Fats usually make up the remaind r f the ca oric intake after the protein and CHO por tions have be n selected Most of the prot in containing foods a.so certain fat which mu t be calculated in d t rmining total fat intake (see pag 48)

Caloric Value of Servings of Pure Fats
(E ch quantity equals approximately 40 Calories)

1 t p butter 1 tsp marg rine 1 tsp animal f t 1 tsp oil
1 t p lard 1 tsp mayonnaise 1 Tb p light cre m 1 strip bacon
One squ re pat of butt r or m rg rine 80 100 Calories

[illegible]

Thes normal daily requirements are adequately supplied by the ba ic di t shown on page 45 It is only in cases of restricted diets or bnormal metabolic states (e g diabetes fevers thyrotoxi osis digesti e absorption etc) that itamin supplements m y be necess ry For therapeutic dosages see pages 58 to 64

DAILY ALLOWANCES OF VITAMINS (N R. C 1953)

Vitamin and Daily Requirement	N t ral Sourc s
A 5 000 8 000 I U	Vitamin A Milk butter and liver oils Carotene precursors Carrots sweet potatoes apricots spinach thin green leaved vegetables
B_1 Thiamine 1 2 1 6 mg	Y ast n l whol gr in real b ans liver egg yolk
B_2 Riboflavin 1 4 2 5 mg	Milk yeast eggs liv r meat
P P Niacin 10 16 mg	Li ye st me t rice bran whole wheat
C As o bi A id 70 150 mg	Cit u fruit gr p pp r parsl y tomatoes cabbage radishes
D 400 Units	Butter live egg yolk fish liver oils

STEP 9 – DETERMINE THE NEED FOR MINERAL SUPPLEMENTS

Daily requireme ts of th minerals are suppli d in a well balanced diet (e page 45) Additional mount ar required wh n an ab o mal loss or increased d mand arises the gi en min r l is usually then p es ribed as drug Th 2 deficien ies most likely to occur are those of calcium and i on Iodin d fi i cy in n d mic areas can be prevented if iodiz d salt is used

DAILY ALLOWANCES OF MINERALS (N R. C 1953)

Mi l	Allow e	Natur l Sour e
Min l mo t apt to be d fi i t		
Calcium	0 8 Gm for adults 1.5 2 Gm for pr gnant and lactating wom n	Milk and milk p od cts (1 Gm alci m/qt)
I on	12 15 mg for child e m at uating wome Le in m d inf ts	L gg y 'k kid y beef whol wh t gree veg t bl
Min als l t pt to b d fi i nt		
Coppe	1 2 mg	Liver gg yolk bran o tm l
Iodine	0 12 0 3 mg	iodi ed s lt Vegetables g ow i iod e i h s il
Sod um	2 5 Gm	T bl lt m lk meat eggs
Ph pho	1 1 5 Gm (2 5 3 Gm d ing pregnancy)	Milk ll gg y lk cere ls nuts bean
Pota ium	1 4 Gm	All v get bl and f uits

STEP 10 – REGULATE THE NUMBER FREQUENCY AND TIME OF FEEDING

In th man g m t f rt in dis a it m y be me nec s y t give gr t r numb r of larg o m ller fe d g p d t gular intervals o r the g t portion of th d y The diti ns in whi h the e a important in l d

1. M lnut ition fe er thyr t xi osis i ju y Fr que t g ous f edi gs to incre e di t y i t ke
2. P ptic ul Fr qu t sm ll f edi gs to maint i c st t buff ing a tion
3. Di betes F qu t sm ll f d g t m i t i mo e con stant blood g
4. D d g st ic capacity (e g post g t tomy) Fr qu nt sm ll f edings

STEP 11 – GIVE DETAILED INSTRUCTIONS TO THE PATIENT

When th di t h s be n mpl t ly plan d efully e plained and fully w itt n instruction m t b g e t the p ti t Th e hould in l d mpos ti i f f dings number of me ls and time of e ting The f llowing de ipti of the d ts will aid in form lating th se instru tion

PRINCIPAL TYPES OF DIETS

The following diets are planned around the Basic Foods which form the nucl us of a w ll balanced d t See table on page 45

See table on page 45

S ppy Di ts

Progr ssive non irrit ting, buffering diets taken on regular schedule

Composition

St g I 3 oz (90 cc) half mi k and half cream (18%) every hour from 7 00 a m to 7 00 p m

Stage II Stage I plus 3 feedings of refined cereal (3 oz per serving) and 1 soft cooked egg t i d

Stage III Stage II plus creamed soups and pureed vegetables

Stage IV 3 oz (90 cc) milk and cream every hour plus regu lar meals of small feedings of lean meat potato, pur ed veg tables refin d cereals and breads custard puddings cream and butter

R tri tion Meat e tracts bran raw vegetables and frui s tea, ct e condiments spices alcohol and carbonated beverages

Meu ngracht s Diet

Em y y 3 in b eding peptic ulc rs As now generally employed means frequent feeding of puréed foods Originally described as follows

6 a m Tea white bread and butter

9 a m Oatmeal with milk white bread and butter

1 p m Dinner As much as desired of meat balls broiled chops omel t fi h balls vegetable or meat or fish gratin mashed potatoes vegetable pur es or soups creamed vegetabl s stewed apricots applesauce gruel, and rice and tapioca puddings

3 p m Cocoa

6 p m White bread and butter sliced meats cheese and tea

Bland Di t

A no mal diet modified to be smooth, non irritating and bland in ta te May also be used as low residue diet

Composition Lean meats fish poultry egg milk potato pu ed vegetables and fruits refined c reals and breads cus tards puddings gelatin dess rts cream butter margarine salt and sugar in mod ration

R strictions Fried foods raw veget bles fruits and fruit juices pi e condiments bran whole grain cere ls and bread arbonated beverages alcohol and coffee

Low Fat, Non C Fo ming Di t

Composition Lean meat fish poultry skimmed milk or butter milk cottage cheese cereal products bread vegetables and fruits except those listed below gelatin desserts sherbet puddings without cream sugars and j llies

Re trictions Pork ham bacon fatty cuts of any m at cream c bb ge f mily onions turnips cucumbers radi hes green peppers dried beans and peas melons raw apples b tter margarine mayonnaise oil nuts chocolate fried foods pastries and highly seasoned foods

High Prot in High CHO Low F t Di t

Composit on A low f t diet with stres pla ed on large servings of l an me t eggs skimmed milk or buttermilk cottage ch se cereal bre ds fruit juices ug r and j lly To cal cul t a definit amount of prot in for thi di t see tables on p ge 48

R stri tion . Same as for low f t non gas fo ming diet

High Residue Di t

A no mal d t with a maximum of bulk

C mpo ition All of the basic foods with extra servings of whole gr in cer ls and b ead raw veget bl s and fruits and an adequate amount of fluids

R t i tion None

Diets R trict d in Sodium Content

Sod um stri t d d ets sually employ 1 5 Gm of sodium (3 75 Gm sodium chl ide) or unde For best th rapeutic r ults di ts should cont in less than 600 mg of sodium (1 5 Gm odium chloride)

The following two low sodium diet both ontain 2 000 Cal rie Th y a the same in composition xcept f r th b ver ge

250 mg odium diet use Lonalac® s beverage
500 mg sodi m diet use whol milk a be e age

B akf t	
Fru t	1/2 cup
S lt f ooked o puffed real	1/2 up
S lt fr e b ad	1 sli
S lt f e butt r or ma g ine	2 tsp (1 pat)
Egg	1
Lonala ® or whole milk	1/2 cup

Noon and E ning M l	
S lt f e f h m t	3 1/2 o
S lt fr e pot to o ri	1/2 cup
S lt f e cook d o r w veg tables	as desi d
S lt f e bread	1 slice
S lt fr e butt r o margarine	2 t p (1 pat)
F it	1/2 up
Lonalac® or wh le milk	8 oz

A I stru tion (s R t ictions on F ll wi g P ge).

1. Lonal c® is pr pared by mi ing 1/2 cup d y p wd with 2 cups of w t this m y be fl o d with chocol t
2. To mak salt f m g in w sh and kn ad m rg rin in five change of cold wate
3. Us f h o f oz n v g t bl s o spe i l salt f canned veg tables M y us rtichok b ts car ots spi ch and other g e n twi w kly
4. U e only fr h c oked fruit
5. Use ly g an l t d g l tin in l ds and d ts
6. M y u p ppe he bs and oth r spices
7. M y u one f th sodium f salt substitute

B. Restriction
1. Ham, bacon, bacon fat, salt pork, corned beef or pork luncheon meats, canned meats, fish, or poultry
2. Prepared cereals with salt, quick cooking cereals, breads leavened with baking powder or baking soda
3. Prepared foods or prepared desserts
4. Canned vegetables, dried fruits, commercial salad dressing, catsup
5. Salted nuts, salted popcorn, potato chips
6. Garlic salt, onion salt, celery salt, salt, baking powder, baking soda
7. Celery, olives, pickles, relishes, chard
8. To avoid distention: Cabbage family, onions, turnips, peppers, dried beans, cucumbers, sweet potatoes, raw apples, melons

C. Approximate Sodium Content of Common Foods (in mg. per serving). This list gives the natural content without the addition of salt, baking powder or baking soda.

1. *Fresh meat, fish and poultry*: 3½ oz. (100 Gm.) a serving

Lamb	78-98	Oyster	73	Chicken leg	110
Pork	58	Cod fish	60	Turkey leg	97
Beef	51	Halibut	56	Chicken breast	78
Veal	48	Salmon	45	Turkey breast	40

2. *Egg* (1): 40
3. Milk: 7 oz. glass (200 cc.): Cultured buttermilk 270, fresh whole milk 110, reconstituted whole milk (Lonalac®) 3
4. Cheese: 1 oz. (30 Gm.): Processed 450, cheddar 210, cottage 100, cream 75
5. Legumes: ½ cup (4 oz. or 120 Gm.) fresh or ⅛ cup (1 oz. or 30 Gm.) dry: Beans and corn 0-1.1, split peas, dry 42
6. Cereals: 1 oz. (30 Gm.) dry, ¼ cup: whole grain cereals or pastes (macaroni, etc.) 0.5-4; 1 cup dry, cold cereals 200-350, puffed cereals 1
7. Bread (1 slice) and crackers:
   Commercial bread 180-350; 6 Soda crackers 330
   Yeast bread without salt 0.5; 1 Matzoth, plain 0.3
8. Vegetables: 3½ oz. (100 Gm.) a serving of fresh or frozen (not canned). (For size of serving see page 49)

Artichoke	43	Cabbage	5	Endive	18	Potato	
Asparagus	2	Carrots	31	Kale	110	skin less	0.6
Beans	1.2	Cauliflower	34	Lettuce	12	Pumpkin	0.4
frozen	2	Chard	200	Okra pods	1	Spinach	82
Beets	110	Celery	110	Onion	1	Squash	0.5
Broccoli	16	Corn	trace	Parsnips	7	Tomato	3
Brussels		frozen	6	Peas	0.9	Turnip	37
sprouts	16	Egg plant	1	frozen	100		

9. Fruit: 3½ oz. (100 Gm.) a serving (for size, see page 49). Fresh, canned, and frozen fruits contain less than 10 mg. sodium per serving.
10. Fats: 10 Gm. (2 teaspoons)

Margarine	110	Sweet butter	0.5	Shortening	0.1
Regular butter	98	Oil	0.2	Lard	0.3

11. *Sweets*: 10 Gm. (2 teaspoons)
    Sugar, minute amounts; honey 2.0, jelly 0.2

12 Miscellan ous –
Beer 8 oz 19 Coca Col ® 1 bottle 1 8
Ging r ale 8 oz 19 N ts 1 oz (30 Gm) 0 5
Coffe t natural herbs and ondiments ontain only n gligible amounts of sodium

Diabetic Diet

A c l ul ted di t with regul t d amounts of p tein f t and c rbohydr te

1800 C l l

B kf t (7 00 9 00 a m)
1/ c p 10% f it
2 gg any style
1 tsp b tt r o margarine
1 gla s skimmed m lk

Mo ing F ding (10 00 m)
1 gl s k mm d milk
1 i h cube proc ss d ch
or ound d Tbsp n t

Noon M l (12 00 1 00 p m)
3 oz any lean me t
ch k r fish
1/2 c p 5% g t bl
1/3 up 5% eg t ble
S lad 5% v get ble
2 t p butt o m rgarin
1/2 cup 10% fruit
1 gl s milk

Aft rnoon F di g (3 00 p m)
1 gl kimm d milk
1 ounded Tb p nuts
or peanut b tt r

Ev ing M al (6 00 7 00 p m)
3 any l an m t
chi k n fish
1/2 p 5% g t bl
1/3 p 5% v g t bl
S l d 5% veget bl
2 t p butter or m rg rin
1/ p 10% f uit
1 gl milk

B d Tim F di g (9 00 10 00 p m)
1 gl s skimm d milk
1/ p (s ant) tt ge
ch

2500 Calori

Br kf t (7 00 9 00 m)
1/ cup 10% fruit
2 egg y tyle
2 strips b on (sp)
Coffe o t as d si d

M i g F ding (10 00 a m)
1 up wh l milk
2 1 inch be p ocessed
h o 1/3 p p uts

Noo M l (12 00 1 00 p m)
1/ c p cottag h s
1/ c p 5% g t ble
1/2 cup 10% veg tabl
1/ c p 10% fruit
2 t p b tter or m g ri e
1 c p whole milk
Coffee or te d i d

Aft rnoon F eding (3 00 p m)
1 p whole milk
2 1 i h ube proc ss d
h 1/3 p p an t

E ning Meal (6 00 7 00 p m)
4 oz l an m at chick or
fi h
1/2 up 5% v g tabl
1/2 up 10% veg t ble
1/2 c p 10% fruit
2 tsp b tter o m g rine
1 cup skimmed milk
Coff or tea as desired

Bed Tim F ding (9 00 10 00 p m)
1 up wh le milk
2 1 inch cubes p ocess d
he se o 1/3 cup p anuts

High Calorie, High Protein, High Vitamin Diet

A normal diet containing extra foods high in protein and all of the vitamins

Composition: All of the basic foods with increased amounts of meat, fish, poultry, liver, eggs, milk, cheese, whole grain cereals, carrots, green vegetables, citrus fruits, butter or margarine (see table on page 48 for high protein foods and table on page 50 for high vitamin foods)

Restrictions: None

Low Calorie Diets

Adequate protein, bulky diets which are lower in calories than the patient's daily requirement (see page 45). Amount of food listed in each diet is the total daily intake

1200 Calorie Diet
- 5 oz. lean meat, fish, poultry or cheese
- 1 egg
- 1 pt. skimmed milk or buttermilk
- 1 slice bread
- 1 serving (1/2 cup) potato or equivalent
- 2 servings 10% vegetables
- 3-4 servings 5% vegetables
- 2 servings 10% fresh fruit
- 1 serving 15% fresh fruit
- 2 tsp. butter or margarine

800 Calorie Diet
- 3 oz. lean meat, fish, or poultry
- 2 oz. cottage cheese
- 1 slice bread
- 1 serving 10% vegetable
- 3 servings 5% vegetables
- 3 servings 10% fruit
- 1 pt. skimmed milk or buttermilk

1000 Calorie Diet

Omit the following from the 1200 Calorie diet
- 1 serving potato
- 1 serving 10% vegetable
- 1 serving 5% vegetable
- 1 tsp. butter

1500 Calorie Diet

Add the following to the 1200 Calorie diet
- 2 slices bread
- 3 tsp. butter or margarine
- 1 serving 15% fruit

Restrictions: All foods, candy, and beverages except those listed

Low Protein Diet

A normal diet with the protein foods limited to the minimum but adequate amount

Composition: Meat, fish, poultry, legumes, eggs, milk, cereal, bread, and nuts limited to give the desired protein intake (see page 48 for protein values). Vegetables, fruits, fats and sugars may be taken as desired

Restrictions: Protein foods in excess of the specified amount

Special Elimination Diets

A normal diet from which have been eliminated the foods suspected of causing allergic reactions. Such reactions are produced most frequently by wheat, eggs, and milk; less frequently by citrus, nuts, chocolate and fish. Other foods may infrequently cause reactions

More specialized diets have been prepared by all rgi ts and are used both diagnosti ally and th rapeutically Consult books on all rgy for these diets

Low Purin Di t
Diet low in nucl oproteins
Foods Forbidd n Live kidn y sw etbreads sardin s anchovi s brains whol grain products gravy soups meat ext actives asparagus beans cauliflow r peas l ntils and mushrooms
Food Rest icted All other m at fish, and fowl
Compo ition All other foods are allow d Most protein to be de ived from eggs and dairy product

TUBE FEEDINGS

Tube f edings employed when sw llowing is impossible or pati t is oth rwise unable or unwilling to tak food by mouth A onvenient means of admini tering th feedings is with a small polyethyle e tube p s ed intranasally Many food mixtures may b given th only requirem ts are that the food be fluid or in a suspension of very small particles

Protein hydrolys t s are oft n irrit ting Formulas containing egg t nd to occlud th lumina of sm ll tubes Ex llent formul can be p epar d by using milk (occasionally lots in t be) c lcium as inate Lonal c® trained m ts lactose sucro or glu s F ts such as lad oil m y be add d if emulsified with Tw n 80® or a similar agent Vitamins and min rals re added as indicat d

E ampl s of tube f eding formulas are as follows

1 Low al ium high prot in di t - Supplies 3 000 Calo i s pe 3 000 c (1 C l /cc) ontain 133 Gm p otein

St in d canned baby m at	400 Gm (4 ans)
Tom t juice	1900 c
Prune jui	90 cc
All purpose Soyala ®	200 Gm
La tos	315 Gm (1 1/3 cup)
Wate q d	3000 c

2 In xp nsive high protein f mul 3 000 Calori per 3 000 (1 Cal / c) tain 120 Gm protein

Homog i d milk	2200
1/2 milk and 1/2 ream	600 cc
Eggs	6
Dext i Malto e® o l ctose	7 Tb p

3 Low odium high p ot in f rm l 3 000 Calories p r 3 000 c (1 C l / c) ont ins 150 Gm p ot in 78 mg sod um

Lon l c®	600 Gm
W t q ad	3000 cc

THE VITAMINS

The vitamins are organic substances which are essential for life and which must be supplied to the organism from exogenous sources. They are not amines but appear to function as enzymes or coenzymes in important metabolic processes.

The best and only certain source of all the vitamins is a well balanced diet. Therefore a healthy person with proper nutrition does not require vitamin supplements, yet many persons, even in good economic circumstances, eat less vitamin containing foods than are necessary for optimal health.

No evidence exists to show that vitamins exert a tonic effect. There is much indiscriminate use of the vitamin supplements.

Since there may be considerable variation in the body requirements depending upon age, activity, diet, metabolic rate, and other factors affecting the absorption, utilization, and excretion of vitamins. Vitamin deficiencies are almost always multiple, particularly of fat soluble or B complex vitamins as a group. Early signs of vitamin deficiency are usually non specific, vague, and mild and are easily misinterpreted or missed entirely. The crude sources of the vitamins are often more efficacious in therapy than the pure or synthetic. *Only during the more severe phases of the deficiencies* is it usually necessary to resort to the use of "pure" vitamins. The use of a "pure" vitamin in the face of a true multiple vitamin deficiency may aggravate rather than help the condition. Treatment *of vitamin deficiencies requires an adequate, balanced, high protein* and high vitamin diet in addition to necessary vitamin supplements. In general, it is wise to use vitamins therapeutically in 5-10 times the amounts required for daily maintenance.

The Recommended Daily Dietary Allowances listed below are adopted from the recommendations of the Food and Nutrition Board of the National Research Council (Nutrition Reviews 6:319, 1948).

FAT-SOLUBLE VITAMINS

VITAMIN A

Vitamin A is necessary for normal function and structure of all epithelial cells and for the synthesis of visual purple for retinal rod function and hence for vision in dim light. Carotene, precursor of *vitamin A, is converted to vitamin A*, probably in the liver. Vitamin A is stored in the Kupffer cells in increasing amounts with increasing age up to adulthood. If vitamin A intake is massive (e.g. 500,000-1,000,000 I.U. daily), it may cause alopecia, itching, and bone pain from new growth of periosteal bone. The principal dietary sources are leafy green and yellow vegetables, whole milk, butter and eggs.

Recommended daily dietary allowances (1 U.S.P. unit = 1 I.U.) are as follows: Adults, 5,000 I.U.; during pregnancy, 6,000 I.U.; during lactation, 8,000 I.U.

AVITAMINOSIS A (code No 010 761)

Avitami is A i due to in d quate intake (espe lally in chil dren) poor ab orption and in some i tanc s fail re of the liver to onvert a ot n to vitamin A

A Mild o Early Manif st tion Dryne of the skin ight bli d a d foll ul hype k r tosis

B Seve o Lat M nif tations X rophthalmi atrophy and ke tini t on of th kin and keratom l cia

C T ts f Deficie cy D k adapt t n is imp ired Low blood l of s ot ne or vitamin A may be h lpful A th r p utic t st with 25 000 75 000 I U daily for 4 weeks m y also be empl yed

Tr tm t

Ol ovitamin A U S P Vit min A B P 15 000 to 25 000 I U on e twic daily u til ymptom improve If abs rption d f t is p esent t m y be n cessary to admini t r b le alt w th the vitamin A or to gi e th same dos g of vitamin A in oil I M (50 000 units/cc in e ame oil) o imilar d of an acc pt d vitami A and D prepa ation Ski l ions may requi e more tre t me t

VITAMIN D

Vitami D has two important a tions It i as e th inte ti n l ab ption of calcium and urin y tion of phosphorus It is st r d in the live kin and brain Do of vitamin D ove 5 000 10 000 I U /Kg f body wt p d y m y l d to m tastatic al ifi tion with phroc lcinosis The p inc pal d et y s re butter egg y lk i adi t d milk and fi h but not even thes food re t h in it min D

R mm nd d d ily di tary all wan s (1 U S P unit 1 I U 0 025 m og m of y talli e calciferol) d ing d l (g 12 20) pr gnan y and la tation 400 I U the orm l dult allowanc is unk ow M vit min D is ne essary in the b c of ultraviolet light which i d t a t r l pr or (7 dehyd o h le t ol) in th skin Vitamin D p r i f und ly in anim ls th plant st l is mer ly a p ecurso

AVITAMINOSIS D (code No 010 764)

Avit min i D is u u lly d t inad q ate di tary intake l k of unlight o b orption d f t

A Clinical Fi ding Lack of vitamin D le d t o teomalacia In child n thi i known a rickets (see page 380)

B T t f Deficie cy Serum calcium and ph pho may b n rmal o d c d and alkaline ph sphatas is g nerally in re sed Urinary alcium xc tio i d c a d

T tm t

A Ri ket Oleovitamin D U S P Vit min D B P o C l ifer l U S P (D_2) or 7 d hyd chol st l ti t d U S P (D_3) 1 000 2 500 I U or s milar d se of an pt d

A and D preparation daily by mouth for several months plus adequate milk Some cases of rickets are exceedingly resistant and require huge doses of vitamin D (50 000 150 000 I U per day)

B Osteomalacia (See page 385)

VITAMIN E

Although vitamin E plays a role in the normal physiology of certain animals there is no satisfactory evidence of activity in humans It is relatively non toxic It has been used without apparent benefit in some cases of habitual abortion in doses of 50 100 mg α tocopherol daily It has also been used without satisfactory results in some neuromuscular syndromes and in heart disease

VITAMIN K

Vitamin K is necessary for prothrombin formation by the liver and hence is important for proper blood coagulation Bacterial synthesis of vitamin K occurs in the intestine It is not stored in appreciable amounts in the body Naturally occurring vitamin K is non toxic but menadione in doses of 180 mg is reported to cause vomiting porphyrinuria, and transient albuminuria The principal dietary sources are green leaves of plants especially spinach, cauliflower cabbage and lettuce egg yolk and soy beans Daily dietary needs are unknown

AVITAMINOSIS K (code No 010 766)

A dietary deficiency of vitamin K probably never occurs Liver disease may affect the normal synthesis of prothrombin by liver parenchyma or may cause inadequate bile formation which may interfere with absorption Some drugs (e g salicylates) tend to lower prothrombin and thereby to increase the requirements of vitamin K Avitaminosis is manifested by hemorrhages especially from mucous membranes or at points of trauma and by a prolonged prothrombin time

Treatment

A Liver disease when associated with a lowered prothrombin, should be treated with 2 5 mg Menadione Sodium Bisulfite Injection U S P or Menaphthone Injection B P daily I V or I M even though the ability of the liver to form prothrombin may be impaired Menadione 1 3 mg by mouth *with 1 4 Gm bile salts to increase absorption* may be used especially in cases of biliary obstruction

B Pregnant women generally should receive 2 5 mg menadione sodium bisulfite I V or I M 12 72 hours before delivery to prevent bleeding in newborn infant

C Dicumarol® toxicity (see page 217)

WATER-SOLUBLE VITAMINS

VITAMIN B COMPLEX

The m mbers of the vitamin B complex are very intimately associated in occurren e as well as in function As a result of this cl se interrelationship, it is doubtful that a d ficiency of single B vitamin ver e i ts xcept under xperim ntal conditions De ficie cy of a si gl member of th B complex wo ld l d to impaired m taboli m of th other H nce although c tain cli ical f atu es m y p edomin te in the abs c of a single membe f th c mplex thi does not ignify that th defici ncy c be e tirely co rect d by administ ring that singl fact Th r fore specific the apy m st always be ppli d in the pres n e of d quate (d et y or pare ter l) ources of all of th other members of the B ompl x W t r soluble vitamins should b administ d in divided do s throughout th day to p vent e ssive loss in the rine

VITAMIN B_1 (Thiamine Hydrochloride)

Thi mine hydrochlo ide (an urine hyd ochl ride) fun tions primarily as coen yme conce n d with pyruvic id d s bo yl tion he p ve ting ac umul tion of l cti cid It i p ob bly active in se eral other e ym system s well The ed fo this vit min va i s with the amount of rbohyd t m t boli ed It i eadily abso bed from th intesti e and dily cret d by th kidney with limited st ge in muscl li r kidney h art and b ain

R omm nd d daily di tary all wan e is 1 2 1 6 mg for adult and 1 5 mg duri g p gnancy and la tation The p incipal di tary sources yeast the hull of grai li e lean p k and peanuts b t in th foods th co t nt is sm ll (St ming o expos r to m ist h at red ces the thiamine ont nt f foods)

AVITAMINOSIS B_1 (Beriberi) (code No 010 7621)

Avit minosis B_1 res lts f m an in dequate intak d e u lly t idi yncrasies of diet or excessi e cooking o p oces ing of foods The increased need for vit min B_1 du i g feve high CHO intak or thyrotoxi osis m y le d to d fici y

A <u>Mild or E ly Manif station</u> V gu multipl ompl ints sug g sting e asthe i nd in lude s or xia f mication and mus l cramps tendern of c lves p sth ias and hyper activity f llow d lat r by hypoactivity of kn and ankle j k

B <u>S or L t Manif t tions (B ibe i)</u> Severe anorexi p lyn ritis s ous effus on subcuta ous ed ma p alyses (p rticula ly in extremiti s) and c di insuff i ncy man fe t d by t hy ardia dy pn ed ma and no m l or d c sed circulat on time le at d venou pres u and on pecific E g hang s

<u>Tr tm t</u>

A <u>Thi mine Hyd ochl ide U S P A eu ine Hyd hlorid B P 20 50 mg o lly I V</u> 1 M d ily in divid d dos s fo 2 we k then 10 mg d ily by mouth until d ficie y impr v

B <u>Dri d Y ast T blet</u> , U S P (b w s y t) 30 Gm t i d

C <u>D t</u> Well b lanced (2 500 4 500 Calorie) diet wh n tol at d

VITAMIN B_2 (Riboflavin)

R b f vin functi ns prim ri y in the u respiration enzyme s s m con erned wi h ox gen transp rt It is readily abs rbed fr t e in st e has limit d storag in th body and is ex r ed in t e u ne t eit has been r ported

R mme ded daily i tary allowanc s are as follows Ado- l s e (ge 12 20) 1 8 2 5 mg adu 1 4 1 6 mg duri g preg na y 2 0 mg duri g la tat n 2 5 mg The d tary sources in c u e m k m p nts gr en l a y v get bles a d liver

AVITAMINOSIS B_2 (Ariboflavinosis) (code No 010 7672)

Th etiol gical f t rs of aribof a inosis a e similar to those o t iam e def iency h t i ad q te intake of mi k is important The mani at ti ns of d fi i n y usu l y oc ur along wi h thiamine d f ci n y but may occur e rlier

A M ld e l ly M i st tions Oral p i r superfici l fi s r i g a g e d mouth c n nctivitis and p otophobi lack of ig r m a w a ness and weight loss
B Se ere or Lat M f t tion Cheilosis (fissuring at the g e d t e mouth) f ss ring of t e nares magenta tongue wi h mod ra e t m dy phagia orn l vascu arization and ir um orne l in c i n ar l s borrheic dermatitis

T tm nt
A R f vi U S P Riboflavin B P 40 50 mg I V or I M dai y by mou h until all symptoms h ve clear d
B Dried Y t Tabl t U S P (br w r s yeast) 30 Gm t i d
C Well b lanced (2 500 4 500 Calories) diet when tol r ated

NIACIN AND NIACINAMIDE (P P Factor)

This vitamin fun tions primarily in the CHO m tabolism en zyme systems concern d with h drog n transport and glycolysis It is c mpo nt of re piratory coenzym s I nd II Ni cin in dos of 25 00 mg o more orally or I V caus s cut neous vaso- dil tation with flu hi g b rning itching and s nsations of warmth in 30% f persons These symptoms are not prod ed by niacin ami l

The re omm nded daily dietary allowa ces are as follows d les e t (ge 12 20) 12 19 mg adult 10 16 mg d ri g preg nancy and lactation 15 mg The di tary s u ces are liver yea t lean meat who e grain cereal peanuts and potatoes

NIACIN DEFICIENCY (Pellagra) (code No 010 7623)

Th etiologi l fact rs of deficien y are similar to those of thiamine d fici cy Ni in d fici n y is the princip l but not the only di t ry d f ct in pellagr

A Mild or Early Manif t tions Multiple vagu complaints and 1 n d r ugh d kin Redn s and hypertrophy of th p pilla of the tongue

B S ve or Late Ma ifest tions M rked rough ing of skin wh posed t i ght and f iction diarrhea, abdominal dis t ntion carl t red tongue with atrophy of p pill stom titis depr ion clouding of mentality rigidity and peculia suck ing r action

T tment

A Spe if c M u s

1 N ot n mid U S P B P (Niacin mi le) 50 500 mg I M I V or o lly daily until all sympt ms have s b id d Ni otinic Acid U S P B P (i cin) is l ss fr q e tly ed b au e of it v sodilating ffect do age is imila

2 Suppl m ta y vit mins Give th rapeuti doses of thiamin iboflavin and pyridoxine (se dos g under h vitamin)

3 Dried Y t Tablets U S P (b w s ye t) 30 Gm t i d

B Ge l Me su e

1 Di t W ll b lanced (2 500 4 500 C lo ies) high p ot in diet

2 Symptomat c and supportive me res a indic t d

3 Dementi m y quire con tant sup vision

T tme t of Mi ll ous C ditions

h in m y be us d as vasodilati g gent f h ad hes my igias n urological di d rs and d ma of the laby inth (100 mg or more daily in di id d dos s) Ni inamid does n t p sse s this vasodil ting effe t

VITAMIN C (Ascorbic Acid)

Asco b id pa ticipat s in f m ti n and mainte ance of int ll l r (c ment) sub ta of all con cti tis e (d tin cartil ge matrix f bone c ll g n of fibrou tissu) It al o t ans ports hyd g in ellular metabolism d i ti e duc g g t It is r adily absorbed and ex eted the uri It m y be once ned with f m tion of adre oco ti al ho mones No toxic ty has occ d in ral doses of 6 Gm d ily

Th omm d d daily di tary allowan s re follow dolesc nt (ge 12 20 ye rs) 75 100 mg dult 70 75 mg p g na cy 100 mg lactation 150 mg Th prin ipal di tary o rces a itric jui t matoes p prik bell p ppe nd all g n l fy v g tables Coppe ute il h ating r ont t and alk linity all ed ce vitamin C content of food

AVITAMINOSIS C (Scurvy) (code No 010 783)

Avit min i C is u lly d to in dequ t i tak but may occ in a s f prot a ted in d m t boli quir m ts

A Mild or E rly Manif st tion Ed m and h m r hag f th ging po ty of th d nt ne and hyp rk t t h i f lli les

B Se or L t Manif t ti S v m s l h g s sw ll ing f ti j nt rar f t on f bo m rk d bleeding t d cy ext as tion f blood int fas i l lay m loo ni g or l of t th and poo w und h aling

C T t f D fi i cy C pill y resi tanc r duced and fg g am of lo g bon may show typi al h ng Th i l l w ing of s um or whit blood ll bi a id l ls

Tre tm t
A F or Deficiency
1 Sodium Asc rbate Injection L S P., 0 5 to 1 0 Gm I V or I M daily in divided doe s as long as d ficiency exists
2 Ascorbic Acid U S P B P orally in about the same doses
B F r Incr I Dem nd As orbic Acid, U S P 200 300 mg per d y ora ly

Treatment of Misc llaneous Condition
A Vitamin C has also been used in the treatment of certain poisons in doe s of 0 5 Gm or more Proof of its value is lacking
B H aling of wounds or ulcers or recovery from protract d dis eas such as tuberculosis (dosage up to 200 mg daily orally)

OTHER VITAMINS

Pyrid xine Hydrochloride N N R
M y be import t in the transamination and decarboxylation of proteins Pyridoxine may reli ve certain nervous symptoms and w akn ss in pelagrins where niacin fails and may also relieve the gl ssitis and cheilosis in some person unaided by ribofla in *Dosage is usually 10 50 mg I V or I M d ily with other factors of the B comp ex*

Cho ine
Choline is found in phospholipi s and is a methyl donor a lipotropic substance and a growth factor It i found in large quantities in yeast It has been used to prevent fatty changes in th liver parenchyma in chronic li er disea e (see page 282)

Folic A id (Pt roylg ut mi A id, L c i f to)
S ems ess ntial for th m tab lism of cell nuclear materials Effective in certain macrocytic anemias (see page 222)

Vitamin B (L lacti Do n r f ctor)
A phosphorus and cobalt contai ing m terial isolated from purified liver extract It is probably the effective principle lacking *in pernicious anemia (see page 222)*

Vit min P (Rutin H speridin Methyl Chal on)
Th se r i t d s bstances may redu e *capill ry fragility* and may also reduce the threshold of r sponse of the pre capillary sphincter to epinephrine Its use has been suggested in hypertensive conditions with hemorrhagic phenom na and in prevention of frost bite gangre e Dosage Hesperidin methyl chalcone 0 5 1 0 Gm daily orally *R tin 20 40 mg t i d q i d orally Considerable question* has recently been raised as to whether or not vitamin P h s any physiological or pharmacological eff ct in humans Considerable data sugge ts it has none

I o itol
H s been shown to be a lipotropic substance und r certain very sp ial conditions in some species of animals It role in h man *nutrition and its u in li er dis ase are still entirely un lear*

Mi c ll n ou Vit mi s
The rol of p ntothe ic acid ade ylic acid para aminobenzoic acid biotin and vitamin U in humans is at pres nt undetermined and non have s yet been proved to be of therapeutic value

Chapter 5

DISEASES OF THE SKIN

INTRODUCTION

General Pri ipl

A H t y d E min t on

1 T k a c se hi t y f om eve y patie t with kin disease
2 Do n t negl t role of constitutio al f cto in produ t o or aggr ation f kin dis a e (Intern l dis as n rvo s f to s di t y aber tions etc)
3 Examine entir b dy s rface in good light

B Pi nni g th T tm t Th e is a bewild ring iety of d matol g c g t I ge e al it is be t to be th o oughly familiar with th ctions f a few m d came t nd treatm t m thods tha t tt mpt to use a gr at many

1 Consid r th ge l haracte of th individu l skin
   a Dry kins us ally requir lubri ati g o fte ing ag t
   b Moi t o oily skins usually r q ire g s less d yi g g t
2 B gin t tm t with mild simple emedi In g r l
   a A te inflamed lesio s r quir othing o irrit ting g t
   b Ch onic thi k ned l ions requi atim lating or k to lytic ag ts
3 Apply a m ll p liminary am unt of m di m nt t a single mall e to t t f skin s nsitivity
4 Do not chang r medies too f q ntly Allow ag t time t act H w di c t u r medy immed t ly in ev t of untow d l l tion
5 In tru t the p ti t a ef lly on how to pply medi ment
6 *When in doubt as to proper meth d of treatment UNDERTREAT rather th n overtreat*

CORTICOTROPIN (ACTH) and CORTISONE

In c t in of th a t s ver ext i or fulminant d r m t s ortis o rti ot opin (ACTH) m y x rt a d m ti or lif vi g effe t This h been ob e v d ot bly ang tic d m atopi d m t ti foli ti d matiti p mph gus l pu e ythem tosu and d rmatomy it s Thi ff t unf tun tely i f short d tion aft th g t a di c ti u d R l p a not un omm both du i g and aft r t atm nt M in te anc ther py may supp s or co t l t un f the i

dermatoses but a llays cures It is important to understand the ph sio c ic and pharmacologic effects of these drugs to achieve optim m benefits from thera y (see page 383)

T pical use of *hydrocortisone ointment* ei her in the a etat or free a ohol f rm (1 2[1-5]) is very help ul in controlling pruritus conta t dermatiti and e zemas

ANTIHISTAMINES

The anti istami i drugs form a group of chemically related agents w ich appear to block most of the char cteristic effects of h stamine They d not b ock the releas of histamine but e ide tly d pre ent t e h stamin from reacting on the end orga s In t er peuti dos s t ey ex rt a d pre sant eff t upon t e C N S but in higher d s e th y ha e an tia t e fe t There is consider ab e variation in ti ene s tolerance and t icity from drug to dr g and from in i id al t indivi i al Comparab e th rapeutic doses of the va ious anti istaminics have rought similar toxic ef f cts

F mp a d Commonl Used Anti istam i i P e tion
Th drug re gi n t i d to q i d in t follo wing dosages

- A <u>S ati d Ethyl e ami e Derivati (N C N)</u>
    1. Tripe nnam i e Hydrochlo id U S P (Pyribenzamine®) 50 mg
    2. M thapyril e Hydroch i e N N R (Th nyl ne® Semik n®) 25 0 mg
    3. *Thonzylamine Hydrochloride N N R* (N oh tramine®) 25 100 mg
    4. Pyrilam n M al te N N R (Neo antergan® Sangen®) 25 50 mg
- B <u>Alkamine Eth rs (O-C C N)</u> Diphenhydramine Hydrochlorid U S P (Bena ry) 25 50 mg
- C <u>Mis ellaneous Compound (C C C N)</u> Chlorprophenpyridamine M l ate N N R (Chlor Trimeton) 2 4 mg

<u>Cli i al I di tion</u>

Th a tihistamine may be u ed eff ctively in n sal allergies urti aria angioneuroti edema drug reactions serum sickness pruritus due to many forms of d rm titis Meni r s diseas and motion si knes and are indicated to a *lesser ext nt in other* all rgi states (e g allergi asthma and allergic migraine)

<u>To i it</u>

Th antihistamines may prod ce in som pati ts drowsiness r tles ne s nervousness dizziness naus a omiting diarrhea muscular w akness dryn ss of mouth, blurred vision tremors and e en at tim s convulsions

COMMON DISORDERS OF THE SKIN

PRURITUS (Itching) (code No 143)

T tme t

A Spe fic M a u e *Remember that localized (as well as g neral(z d) pruritus may result from systemic causes*

R move or t eat sp cific causes whenever possible

1 Skin infest tions (e g scabies pinworms pediculosis)
2 Skin i fections (e g fungal and bact rial infections)
3 Skin inflammations (on infe tio s) (e g lich n planus e zema urtica ia)
4 Alt r d weat secr tion (e g hyperhid osis anhidrosi)
5 All rgic re tions (e g food drug lothing serum tc)
6 Senil dermatosis (e g s nil skin atrophy)
7 M t bolic di a s (e g di betes hyperthyroidism g ut)
8 Uremia
9 J undi
10 Opi t intoxication (g morphinism)
11 Blood and n oplastic dis se (e g leukemia, lymphoma)
1 Psy hoge ic fact rs (g an iety state)

B Loc l M s r s

1 Shak lotion em lsions a d ointments in orporating th vol til analg sics and ntipruriti s li t d i table on pages 100 a d 107 may be of val e in ellevi g itching
2 Relieve xcessi e dryn s o moist e of skin
   a If skin is too dry soft ni g agents m y afford reli f g ose w ter ointme t (℞ 31 pag 103)
   b If skin is too moist dryi g g nt may affo d relief e g w t dr ssi gs oaks (℞ 1 8 page 98) sh ke lotions (℞ 14 16 p ge 100) and powd s (℞ 9 12 page 99) (specially if proces is ac 1)

   Tub baths Ge r li ed p u itus may b ff rti ely on t olled by lukew rm baths 15 minut s b i d or t i d Aft r b thing th skin hould be blott d not rubb d

   (1) Sodium bi bon te baths 1 up sodium bi rbonate in tubful (50 g llon) of 1 k warm wat r
   (2) Sta h and soda b th 1 3 p st ch and 1 up sodi um b a bon t diss lved tho oughly in tubful (50 gal lon) of 1 kewarm w ter (Sod may be omitted)
   (3) St r h b th Mi 2 ps of or st h with ufficie t ld w t to m k an mulsio boil, and th dd to t bful (50 g ll ns) 1 k wa m wat r
   (4) Tar b ths Di ol 50 100 c Soluti n of Coal T r N F in t bful (50 gallo) of w rm w te (W t h fo se itivity)

   CAUTIO Avoid xcessive drying of skin by over-bathing prolo ged bathing period and xposure to drafts after bathing

C G r l M u

1 Di t

   Foods hould b simpl Avoid ri h nd spicy food
   b T t diets o limin ti n diet sho ld be u ed in u p t d of f od li rgi (see pag 56)

2 P y hoth apy If pru it is p ima ly a m nif

an anxi ty state obsession, compulsion, or a psychotic dis order direct therapy accordingly
3. External irritants (e g rough clothing occupational contac tants) should be avoided
4. Bathing practices Soap should be avoided in individuals with dry or irritated skin Starch bath may be used (see previous page)
5. N ils should be kept trimmed and cleaned
6. Avoid scratching, if possib e because of vicious cycle which can be established
7. Unneces ry medication should be stopped since medication itself can often produce pruritus
8. Antipruritic drugs The following agents may be of benefit
   a. Calcium salts 10 cc of 10% calcium gluconate I V slowly once daily or every other day p r n
   b. Antihistaminic drugs may be tried in certain cases of pruritus of allergic or undetermined etiology For a list of commonly used antihistaminic preparations see page 64
   c. Epinephrine 0 25 1 0 cc (4 16 min) of 1 1 000 solution every 4 hours may be of value in acute cases suspected of being due to allergy (urticaria)
   d. Phenobarbital, 0 015 0 03 Gm (¼ ½ gr) b i d or q i d may provide useful sedation in agitated or emotion ally distracted patients Remember that barbiturates in themselves may produce dermatitis (rarely)
   e. *Autohemotherapy* Some dermatologists advise the in jection of 10 cc of the patient s whole venous blood into the hip muscles every 48 hours for 3 inj ctions
   f. ACTH gel 20 40 mg I M once or twice weekly or cortisone 25 100 mg daily by mouth

DERMATITIS VENENATA (Contact Dermatitis)
(code No 110-3001)
(Dermatitis Venenata Due to Plant Irritants code No 110-378)

An acute or chronic dermatitis which results from direct con tact of chemicals or other irritants with the skin Lesions are most often on exposed parts and may be asymmetric l (cf du to internal agents) Lesions are aggra ated by exposure to the irri tant and this should be avoided Patch tests may be of value in diagnosis as corroboration of clinical impressions

Diagnosis

Surv y the patient s environment and study his total activities to determine irritant

A. *Search for a history of recent exposure to new chemicals* drugs soaps cosmetics or other contact irritants The loca tion of the lesions may be of value in identifying the irritant e g scalp (rinses or shampoos) face (so ps shaving ma terials cosmetics) n ck (jewelry clothing) trunk (clothing) upper extremities (soaps cosm tics plant toxins industrial chemicals) and lower extremities (stockings shoes shoe dyes)

B Use prot ctive isolation in certain selected ca s c utiou re exposure m y h lp to st blish th ir itant

C Patch tests may be of value but false positi e and f lse n g ti e reactions may occur Dermatitis produced by such te ts should r semble the linical d rm titis In the ev nt of a positive r action, a control test should b done on a normal individu l

Tr atment

A Def tive Me res

1 Pr vent re exposure to irritant
   a Avoid soaps and det ge ts
   b Cosm ti s Chang to so alled non alle g nic c meti s or eliminat cosmetics e tir ly
   c Occupational irritants
      (1) Pr tecti e r bber gloves may b us d b t a s ldom indicat d In such ases an inner cotton glo m st b used
      (2) Protecti cr ms (ba rier cre m) m y be tried but a e almost usel s
      (3) Change of occupation or dutie to those not involving use of irritant gents m y be n cessary
   d Plant irritants (spe ially Rhus speci s e g pois n ivy)
      (1) De t ction of plant by ma u l remo l by hemi al m ans (2 4 D or di hl roph noxyacetic a id) a dw llings and in are s f qu t d by peopl
      (2) A oidanc of Rhus inf st d ar as

2 P mpt and tho o gh remo al of irrita ts by p ol ged wa h ing or by remo al with sol e ts o oth r ch mi l agents may be ffectiv if applied very shortly after xposu In th case of Rhu toxin thorough washing with soap a d wate must be don within a few minutes if it i to be f any val

B Local M Tre t stage and type of d matitis (S p g s 96 97 108)

1 Acut we ping d rm titis
   a Do not scrub l sion with oap and w ter
   b Apply soothing solutions (tabl on pag 98) If up tion be ome generali d se th soothing starch and bi a bon te antipruriti bath mentioned on p g 67
      Shak l tion (℞ 14 16 pag 100) may b i d cat d inst ad of wet d ssing or in i te als betwee wet dr ssings pecially in i t trigino s areas r wh n oo ing is n t m rked Lesion on th ext miti s p rticularly may be band ged with wet dres ings
      Hyd oco ti on ointme t 1 2½% ppli d sp ringly 2 4 tim daily may be very helpf l

2 S b t d rm titis (sub lding) Use hak loti s

3 Ch oni d rm titis (dry and lich nifi d) T e t with hyd phili gr asy ointments o reams T rs re perhaps most us f l in this t ge of the d rmatiti

C G al Me u

1 Antihi t minic drug rally m y b of lue (e p g 66)

2 ACTH gel, 20 40 mg I M o corti 25 100 mg orally (with d e pre a tions) m y b t ied and pe t d d lly (S p g 423)

ERYTHEMA NODOSUM (Due to Infection code No 116 1x0)

A tender nodular erythemat us d rmatosis occurring most commonly on the extensor sur aces of the legs and (less often) fore arms It is usu lly caused by toxins of infections and occasionally by drugs The dis ase occurs most commonly in the spring or fall and u ually runs a cours of 2 6 weeks or longer

Tr tment

A Gener l M s e

1 Eliminat or tre t the specific c use
   a Infections Almost all infections coccal tuberculous mycotic or viral are capable of causing erythema nodosum For treatment see specific d seases
   b Exogenous toxins E g drugs or chemicals
2 Rest Hospitalization may be advisab e
3 Focal infections May be corrected although this does not ppear to influence the cours of the diseas

B Local Measures Usually unnecessary but if lesion are troublesome or omplicated, treat ac ording to stage and type of d rm titis (see pages 96 97 and 108)

C Terramycin® or Au eomycin®, 250 mg q i d for several days may be usel l

ERYTHEMA MULTIFORME
(Infection code No 11x 190) (Poison code No 11x 3x7)

An acute inflammatory polymorphic skin disease of multiple or undetermined origin Th re is often a history of drug xposure or of recent or current infection The skin l sions are found most frequently on the dorsa of the hands and forearms and on the feet neck cheeks buccal mucous membranes and genitalia The ill ness is usually s lf limited although it is freque tly recurrent

Tre tm t

A Definiti M sures

1 Elimin te causative factors
   a Chronic systemic infections (e g tuberculosis)
   b Focal infections
   c Sensitizing drugs
2 Penicillin parenteral, 150 000 300 000 units I M is said to d cre se the extent and duration of the illn ss when s condary infection is present
3 Terramycin® or Aureomycin® 250 mg q i d for several d ys may be useful

B C neral M asure

1 B d rest and good nursing care when f ver is present
2 Antihist minic drugs may be tried but results are equivocal *For a p rtial list of official and accept d preparations see page 66*

C Loc l M sures Treat stage and type of dermatitis (see pag s 96 97 and 108)

1 *Acute lesions Employ simple wet dressings* and soaks or soothing lotions For treatme t of bu cal l sions see page 261

2 S bacute lesions Soothing lotions

Prophylaxi

Avoid ll unnecessary m di ation in su c ptible individu ls i e p tie ts with previous history of ythema multiform

ECZEMA (code No 111 390)(and Eczematoid Dermatitis)

A l rg group of non specific acute or chronic supe ficial in flamm tory skin reactions which occur as result of exposur t ch mical physi l or unknown irritant or as a result of ll rge s Irritants may be ext rn l (e g c tact d rmatiti) o intern l (g d m titis m dic mentosa) The e m y be a histo y f allergic tende ie (topi cz ma) and blood eosinophilia may be found Th t rm ec ematoid d rm titi i u d for eczem lik e ctions of undetermined o igin Th l sions of e em a usually pruritic Acut lesions are usually ryth matous vesicular o exudativ Chronic le ons are usually thicken d de quamati e li h nified

Tre tm t

A Sp ifi M

1. Elimin t on of inciting ag nt (b ve) is in a s s th only spe ific m asure A c reful history tri l and e r limin tion and exposure technic may b of val in in imin ting sp ifi off ding g t Skin t st ar ften v lu less De nsiti tion i f no val e Sen itivities are us lly m ltipl
2. Di t Sho ld b ad q t and w ll b lan d Th i no vid t gg t th t standardi ed outine diet ry r st iction ar of l e esp cially in ad lts Trial d t o liminati n diets m y be of lu in d t rmining food ller g s in individual ca s wh an urti l l component is prese t F od di I m y be k pt by pati nts with h oni e m to d t rmine possibility of food ll gy Reported ommon food offend rs a wh t milk gg po k fish sh llfi h tom toes st awb i and hocol te
3. Psy hoth py A att mpt m y be m de to determin and c t e i ting emoti l di tu bances b t this is of no pr ctical valu
4. R mo d finit fo i of infecti n b t a id outin poly urge y

B Ge e l M asu e

1. Antihi t mini drugs occasionally p o ide b neficial r sults although spons in gen ral is dis ou ging (see p ge 66)
2. ACTH o ti on may provid spect cular imp o me t in sev or fulminant ma (p g 423)

C Loc l T tm t

1. A id ll unn ary local ir it tion to the kin su h may o ur f om e siv b thing o s a r sult of xpo ur to irrit ting drugs hemi al g e and so p S pl det g nts a not advis bl Cl ar up skin inf ctions p omptly (particula ly tho with xud tes) by approp iat m asur (e p ges 85 87)

2 Hydrocortisone 1 2½% ointment applied sparingly twice a day may be very helpful
3 Treat the clinical type and stage of the dermatitis
   a Acute weeping lesions Use solutions listed in table on page 98 as soothing or astringent soaks baths or wet dressings in the daytime for 30 minut s t i d or q i d Shake lotions (℞ 14 15 page 100) may be employed at night or when wet dressings are not desirable Lesions on extremities particularly may be bandaged for pro tection at night Powders (℞ 9 11 12 page 99) may be used in intertriginous areas when oozing is not marked
   b Subacute or subsiding lesions may be treated with shake lotions which may incorporate mild antipruritic or mild stimulating agents (see page 107) Shake lotions are usually preferred for widespread lesions Ointments (see page 104) containing mild tar may be used (see table on page 106)
   c Chronic dry licheniff d lesions are best treated with ointments creams and pastes (see page 102 3) employing lubricating keratolytic antipruritic and mild kerato-plastic agents mentioned in the table on pages 106 7 as indicated The tars are perhaps the most popular thera peutic agents in chronic eczema (2 5% coal tar in oint ments creams and pastes)
4 X ray therapy may be used effectively if only temporarily in many stages Treatment by x rays must be reserved for the specialist

DERMATITIS MEDICAMENTOSA (Drug Rash)
(code No 110 3)

An acute or chronic inflammatory skin reaction which is caused by a wide variety of drugs and which causes a wide vari ty of skin lesions in susceptible individuals The reaction may be immediate or delayed (to a few weeks) and may or may not be associated with constitutional disturbances (fever he dache etc) Improvement following withdrawal and elimination of the suspected drug usually takes a few days but may take longer As a rule it is not advisable to attempt a diagnostic provocation or an e ac rbation by re exposure to the drug Skin tests are seldom of any value

Treatment.
A Specific M asures
   1 Stop all d ug if possible
   2 Hasten elimination of drug by increasing fluid intake
   3 Give specific detoxifying agents
      a Dimercaprol, U S P (BAL®) m y be tried in cases due to heavy metals (arsenic mercury gold etc) (see page 536)
      b Sodium chloride 5 10 Gm (75 150 gr) daily orally may hasten elimination of bromides and iodides in cases due to those drugs (see page 538)
B General Measures.
   1 Discontinue all unnecessary medication, when feasible for

as long a pe iod as possible

2 T t systemic manif station as they arise e g an mi icterus purpura etc

3 A tihistamini s m y be of alue in r a tion of urtic ri l and angioneur tic har ter (see page 66)

C Loc l M a Tre t th va i ti and stages of dermatitis ccording to the majo de m titis which is simulat d

1 Ecz matoid (see page 71) 5 U ticarial (see pag 78)
2 A n form (e p ge 78) 6 Bull s (ee page 96)
3 Pruriti (s e p g 67) 7 Liche oid (se pag 74)
4 Pyod rmal (see page 85) 8 Exfoliative (see below)

EXFOLIATIVE DERMATITIS (code No 110 966)

A toue utaneous r tion often du to s itization to tain drugs (g a s nic and g ld) but more commonly used by lymphobl stom it is h cteri d by itching weeping rythem tous p t h which pidly c le e and spr d to become ge eral i ed Finally a desqu m tion or xf liati n of larg ar of skin occ There i an ssoci t d severe constitutional reactio with fe e and oth ystemi symptoms Th disease run ourse of w eks t months and is att nd d with a high m rt lity r te

T tm t *This is a medical emergency*

A Spe ifi M as r

1 St p ll drugs if possibl
2 H ste limin ti n of off ding drug by all means e g by inc sing fluid int k
3 Dimer p ol, U S P (BAL®) This dr g m y l as n th se e ity o d tion of the rea tion du t ars nic g ld (e p g 536)
4 ACTH 20 40 mg I V or I M or cortiso 50 100 mg I V o by mouth daily if indi at d

B G n- l M r

1 P t p t ent t bed in ho pital wh n po sible U talc on b d sh t
2 Ke p oom t w m constant temp tur A oid d aft
3 Inst tut pporti measu es tran fusions plasma etc indic t d
4 *Avoid all unnecessary medication*
5 ACTH or rtisone may p ovide sp t ular improv m t in e e fulminant exf li tiv derm titi (s e p g 423)
6 S ond ry inf tions Pe i illin or othe antibiotic d g hould b giv wh n the e is vid n of b t i l inf cti n (s p g s 85 87 for dos g hedul) Pyod rma is th m t e e compli ation of xfoliativ dermatiti

C Lo l M s

1 Ob e ef l kin hygi n
2 Avoid ir t ting l c l ppli tions
3 T t kin s f ut t nal e d m titis
 Fir t W t d ings oothing b th (se p g 67) p wder (p g 99) and hake lotion (s p g 100)
 b Late S th g o ly l tions (se pag 100) d intm nt (s p g s 102 103)

4. Topical anti infective drugs (e g 1% aqueous n omycin, Terramycin® Aureomycin® chloramphenicol erythromycin, or po ymyxin B ointments) should be used very cautiously and only when necessary (see pag s 85 87 a d 107)

<u>Prophylaxis</u>

P ti ts who are r ceiving drugs capable of producing s vere ex olia ive d rmatitis sho ld be watched carefully for development of kin reactions of all types whi e under therapy The drug should be wit eld until t e natur of any skin reaction is determined Definite sensitization m y be considered an abso ute contraindication to further drug administration

DERMATITIS ACTINICA (code No 110-451)
(Erythema Solare or Sunburn)

An acute inflammatory skin reaction following exposure to solar or other ultraviolet radi tion It m y v ry from simple erythema to severe exfoliation and may be associated with syst mic manif s tations Some ind viduals are abnormally light sensitive

<u>T atm t</u>

A. <u>Symptom ti M a es</u> Treat constit tional symptoms by appropri te s pportive measures Control pain, burning fever and g stroint stinal and other symptoms as they arise
B. <u>Loc l M</u> Tre t as for any acute d rmatitis (s e page 108) First use cooling and soothing wet dressings (s e page 95) and follow with lotions (see page 100) Greases m st be avoided because of their occlusive eff ct

<u>Prop l xis</u>

A. Individuals with very blond sensitive skins should avoid strong and prolonged exposure to the sun or ultraviolet radiation Preliminary conditioning by grad d e posure is advi able
B. <u>Prote ti Agent</u> Apply to skin b for exposure to radiation
   1. Para minobenzoic acid 10% in hydrophilic ointm nt
   2. Carbolated (phenolized) Vaselin ® i a good sunscreen
   3. Menthyl anthranil te (5%) and 5% titanium dioxid cr am
   4. Dig lloyl triol ate cream (Neo A fil®)

LICHEN PLANUS (code No 110 965)

A chronic inflammatory skin disease of unknown cau e ch r act riz d by small flat topp d vi l ceous pruritic papules which are angular in shape (u ually quadril teral) and of varying siz s *they occur commonly on the fle or surface of the forearms a d* inne thighs on the lower part of the b ck and on the g nitalia Ther m y be associat d buccal lesions R sidual pigmentation and at ophy m y occur but u u lly there a e no sequela Lich n *planus may be sim l t d by drug eruptions (bismuth quinacrine)*

<u>Treatment.</u>

A. <u>C l M</u>

1 Phenoba bital 0 015 0 03 Gm (1/4 1/2 gr) b i d q i d
2 Psy hotherapy Patients are often high strung o t and n vous Epi od of d rmatitis m y follow m tion l cris s M a u s should be directed t r li ving anxiety
3 Bismuth subsalicylate 0 2 Gm (3 g) I M on e we kly fo a tot l of 6 12 or more inj ctions has b en ugg t d

B Loc l M ures
1 U hake lotion containing tar (℞ 17 page 100)
2 X ray m y be u ed only in c ses whi h h p ov d f ct ry to oth r forms of tre tme t T tm nt by ay must b r rved fo the pe iali t

PSORIASIS (code No 111 961)

A cut or hronic infl mmatory skin di f g tic eti ology wh h is cha act i d by m ul and papulo qu mo l sions of varying i s and configuration (us lly w th w ll d fin d bo d rs) The lesions have dry ilv y cal s and bleeding o rs wh n the scal s mo ed Pru itus i a cept in flexu r in a t ruptive c s s Th l s ons occu on th ext o u f es of the extr miti and on the trunk nail and lp Th i som times an associated di bling a thriti but o o titut o al f ct s Stippling of th il m y be path gn m i

T atm t
A Ge ral Me sures
1 Clim t W m clim tes s em to ex rt f vo able ff ct
2 N sp ifi internal m di tion (p pos d remedi legion) i of litti val with th ption f arseni whi h i h a dous in w f the re ur t tu of th lesions and the d l yed eff ct of e e iv of rs ni (k t s pith liom s)
a Vitamin D 50 000 100 000 unit d ly h s be n re m m ded R lts eq ivoc l
b A nic F wle s sol tion (p tassium nit ol ti) has b recomm nd d in d f 3 15 dr ps twi d ily in p ti ts with b t h o i l s o Do ge dur tio f admini t tio ind t s and ven advi bility of thi drug i ubj t to m h t o sy It m y b giv in repe ted cou ses if ind t d b t h ou se sh ld n t be gre t r than 2 3 mo ths (p g 239)
Crude l extr ct i 2 c 1 M 2 3 tim s a we k R s lts quivocal
3 P y hoth py R an i imp tant in th p ti i *pt to b d g d d to hr ni ty of th* di as An ttempt sh ld b m d to r li v e sting an ieti s

B Lo l M s s
1 A t p ori sis (Avo d ir it ting timul ting d ug)
Begi with a hake lotio (℞ 14 15 pag 100) o bl nd olntm t (e pag 102) c t ini g 5% d t g t l t o of coal ta
b A l ions b om les t gr du lly in o por t mild

k ratoplastic agents (see page 106) into lotions (see page 100) and hydrophilic oin ments (see page 103) Watch patient carefully

2 Subacute psoriasis
   a Gi e warm baths daily scrubbing the skin lesions thoroughly with brush soap and water
   b Apply incre sing concentrations of keratoplastic or s.imu lating agents (see pages 106 and 107) incorporated in lotions (see page 100) and hydrophilic ointments (see page 103)
   c Solar or ultraviolet irradiations may be applied in grad ually increasing doses
3 Chroni psoriasis
   a Ammoniated mercury ointment 5% locally b i d
   b Anthralin ointment ¼% locally once a day (a oid ey s)
   c Combined u traviolet irradiation and tar regimen (modi fied from Goeck rman) To be carried out daily as need d
      (1) Sm ar 2 5% coal t r ointment (see page 72) thickly on skin and allow to remain for 12 24 hours
      (2) Wipe off ointm nt with mineral oil leaving light stain
      (3) Follow with daily graded suberythema doses of u tra violet light as tolerated

PITYRIASIS ROSEA (code No 111 962)

A common, mild acute infl mmatory skin dis ase of unknown *etiology which is characterized by a papulosquamous eruption on the* trunk arms and thighs and which occurs more frequently in the spring and fall The papules are pink and oval with scaling borders and pale centers they are typically arranged with their long a es along the cleavage lines of the skin A single herald patch may pre de multiple lesions by a period of several days The lesions m y or may not be pruritic The disease usually lasts 6 weeks with or without treatment

Tre tm t.

A Gen ral M sur s. None

B Loc l M. ure.
   1 Acute irritated lesions are uncommon If present tre t as for acute dermatitis with wet dressings (see pages 98 and 99 or with sh ke lotions (R 14 17 pag s *100 101*)
   2 Detergent sol tion of coal tar 5% in starch lotion b i d
   3 Ultraviolet light is h lpful
   4 Pruritus See local antipruritic measures on page 67

SEBORRHEIC DERMATITIS (code No 111 190)

An acute or chronic papulosquamous d rmatitis often associated with excessive oiline s of the skin and occurring in the so called seb ceous area of the body (scalp midportion of face sternal r *gion and interscapular region) The lesions appe r* (1) as yellowish reasy scales or (2) as an acute or chronic ecz matous dermatitis in r s of sebaceous gland conce tration and in intertriginous areas *esions frequently are pruritic*

Treatm t

A Ge 1 M

1 Di t Well balanced adequate di t avoiding excess sweets pices hot drinks and alcoholic beverag s
2 Regul r wo king hours re re tion and sleep
3 Simpl leanlin ss
4 R mov aggravating syst mic factors (infe tions overwo k, motional stre constipation and dietary abnormaliti s)

B Loc 1 M T at type and stage of d rmatitis

1 Acut b ute or chronic eczemato s lesions Tre t ge ally as for dermatitis or e em (see page 71)
2 Sebo rhea of scalp
   a Car f 1 shampoo 1 2 tim s a week with mild soap
   b Ammoniat d m r ury 5% or s lution of co l tar 5% empl yed in hydrophilic ointme t base (see page 103) ca b rubbed well into scalp 1 2 times week and followed by shampoo
   c Mild coal tar scalp lotion (℞ 21 page 101) may be used
3 Seborrh a of n hairy a Mild stim lating lotio s (℞ 17 page 100 or 20 page 101) may be sed Ointment (℞ 36 pag 104) o 3 5% s lf r in hydrophilic oi tment (see pag 103) may b s d (The addition of 1% salicylic acid id in movi g scal s)
4 Sebor h a of intertriginous area Avoid g easy ointme ts Astring t w t d es ings (℞ 1 6 page 98) followed by 5% ammoniat d m rcury in hyd ophilic ointment (see pag 103) m y b u ed

EXTERNAL OTITIS (code No x75 100)

Thi may be considered a variant of seborrh ic d m titis and at tim m y b com an infectiou c ematoid d rm titis A inter f c with c rumino cr tion le ds to inflammation of the canal w ll and pr di pos tion to se ond ry ba teri l inf ction usually with P e domonas a rugi s (Bacillus pyocya eus) F gi are rarely if ev s sat e

T tm nt

A Gen 1 M

1 P cillin, 300 000 unit once o twice daily I M for c ompanying fev and ry ipelatou h nges
2 Phenob bital, 0 015 0 03 Gm (1/4 1/2 gr) b i d q i d

B Local M r s

1 Acut l sions Cool wet d ings
2 To r move c llular d bris if present Gly ite of hydr g n pe o id with c bamide as e r d ops b i d
3 3% Vioform® cr am loc lly b i d
4 Hyd ocortisone ointment 1 2½% loc lly b i d
5 X ay therapy in efractory c s s (must be gi en o ly by a train d pecialist)
6 Polymyxin B bacitracin ointment (P ly porin®) T rramycin® A reomy in® neom ycin or erythro y in ointments (see pag 14)

ACNE VULGARIS (code No 151 7x0)

A common inflammatory skin disease of genetic origin provoked by androgens in the ma e and prog sterone in the f male it is usually found in adol scents with pleom rphic lesions (pustules b ackheads w iteheads enlarg d pores cysts and scarring) localized typically on the f ce neck, chest back and should rs

Tr atme t

A Gen l M asu es

1 Diet Should be adequate and well balanced Avoid excess of carbohydrates *chocolate nuts fatty or fri d foods* alcoholic beverages and spicy foods
2 Eliminat all unne essary medication especi lly bromides or iodides
3 Avoid occupational e posure to mineral oils a d greases
4 Endocrine pr parations Estrog ns may be tri d in the fema e
   a Ent ric coated stilbestrol 0 5 to 1 0 mg (1/120 1/60 gr.) daily by mouth
   b Estrogenic substances conj g ted (Prem rin®) 1 2 mg (1/50 gr) daily or
   c Piperazine estron sulfate (Sulestr x®) 1 5 mg (1/40 gr) daily

   Estrogens shoul l be stopped for one week (pr menstrually) *each month They should not be used if there is a history of* breast or genital malignancy or c hronic cystic m titis A periodic Pap nicolaou s smear of th uteri e cervix and v gina is recommended
5 Aq eous vitamin A 100 000 units orally each day for 3 months may be tried but has limited value
6 Correct systemic derangements Indigestion constipation, malnutrition infection, anemia, and emotional disturbances
7 Vaccines Autogenous and stock vacc nes and other foreign protein antigens have be n employed with equivocal results

B Local Me ur s

1 Local cl ansing of skin and scalp
   a Ordinary soap for cleansing
   b Avoid greasy cl ansing cr ms and other cosmetics
   c *Shampoo scalp 1 2 times a week (℞ 48 page 105)*
2 Extraction and drainage of local lesion in selected cases only
   a Extract blackheads with comedo extractor after soft ning face with hot w ter compresses f r 1/2 1 hour
   b *Inci e and drain fluctu nt cystic le ions with small sharp* scalpel Hot compresses 1/2 hour t i d favor drainage
3 Keratoplastic and keratolytic agents
   a Hot water or boric acid compr ss s (not steaming) may be used to p oduce hyper mia and desquamation of *lesions*
   b *Keratolytic lotions Acne lotion (s lf r zinc lotion) (℞ 19* page 101) or sulfur resorci ol lotion (℞ 20 page 101) may be tried they are applied locally to the skin at bed time and washed off in the morning
   c Keratolytic ointm nts and pa tes Begin with weak preparations and build up s toler ted Apply at bedtim and

r move in th mo ning
(1) S lfur 2 10% in hydrophilic oi tment (s pag 103)
(2) Sulfu and kaolin p ste (B 39 p ge 104)
(3) Quin lor® ointm nt or Vioform® intment (s pag 107)

4 I radiation
a Simpl xposu e to sunlight in g aded do i ft beneficial
b Lit a iol t y May be u d an adjun t t oth t t m nt or to remo e s r Us s b yth m do ur gr d d int v Is up to point of mild e yth ma and l g X ray This ve y eff ti e te hni should n g l be re rved for only the mo s ve es d o ly ft other m re cons rvat m s fail X y th py m st be r s d for th p list

URTICARIA (Hives) (code No 11x 390) and ANGIONEUROTIC EDEMA (Giant Hives) (code No 11x 580)

An ute r chroni inflammat ry skin tion f all g gin m nif ted by multipl markedly p ti wh l e t on f arying izes w th no ch ct isti skin di t b ti nd t tim involving th mu ou m mb an A ut tt k re u lly I mited f m a few min tes to a f w we ks but ha e a tend n y to recu In xt eme ca s a la yng l edema m y e a r spi to y obst u ti n and death Skin infest t ns ont t derm t ti t xi e ythem s etc m y be oth us s of urt i i ti

T tm t
A C I M

1 Pu g tion Initial pu g tion t emove pos ibl antig ni m teri l has b n r commend d at et f t tm t f ut case Ca t r oil 15 30 (1/2 1 o) r l m l 0 065 0 13 Gm (1 2 g) may b giv n Purg d stool may b mi d for int tinal p a it

2 Di t During th ut ph th diet ho ld b impl and f of u h comm n off d s wh t milk ggs po k fi h hellfish tom t s str wberri s d chocol t P st hist y food dia l tri l d t and limin ti d ts m y b h lpf l in d te mining ff ding f od Th p tie t h uld n t em in on r strict d diet unles it an b dem t t d that know f d off nd s e i t

3 A id ll unn c sa y m dic t on Su p t all drug (v n pineph in phed i antihi t mini ACTH et)

4 Drug
a Antihist mini drug oft n giv p ompt d t in d sympt m ti li f If pe i illin whi h i being gi n a lif aving m a u p odu an ti l esp s it is metim s p sibl to tin e th d ug by sim l taneou administ tio of n antihi taminic d g Th m st nly b d with g t Exampl f mmon ly s d antihi t minic d gs gi en on p g 66
b Epin ph in 0 3 1 0 c (5 15 m) f 1 1 000 l t on subc t may b u ed fo acut l si n wh n
(1) Laryngeal dem is suspe t d p es t

(2) Urticaria is intense
(3) Antihistaminic drugs have failed to give relief

c Ephedrine sulfate 0 025 Gm (3/8 gr) orally q i d

d Ephedrine Sedative mixtures for therapy or prophylaxis

(1) *Ephedrine sulfate and pentobarbital sodium*

℞ Ephedrine sulfate	0 025	gr 3/8
Pentobarbital sodium	0 025	gr 3/8

Sig One q. i d

(2) Ephedrine sulfate and phenobarbital

℞ Ephedrine sulfate	0 025	gr 3/8
Phenobarbital	0 015	gr 1/4

Sig One q i d

5 ACTH or cortisone may provide spectacular improvement in *severe or f lminant angioneurotic edema (see page 423)* These drugs should be us d only if it is apparent th t the patient will not respond to more con ervative m asures

6 Miscellaneous measures have been recommended for the chronic form of the disease but th ir value is questioned

a Hydrochloric acid dilute 15 0 gtt t i d a c and during meals Brush teeth after meals with sodium bicarbonate

b Calcium gluconat 1 0 Gm (15 gr) t i d orally p c Other calcium salts may also be used

B Local M s ur A tipruritics are frequ ntly of benefit

1 Soothing antipruritic baths (se page 67)

2 Soothing antipruritic lotions (see page 100)

Prophylaxis

A El min t and avoid re expos re to causative factors

1 Sensitizing drugs Almost all drugs are capable of producing an urticarial reaction Opiates barbiturates salicylates penicillin sulfonamides bromides iodides antihistaminics ACTH etc

2 Sensitizing foods Any food may produce an urticarial response in susceptible individuals and should be consid red in obscure cases (particularly chronic cases) of urticaria

3 Aggravating physical factors e g excess heat and cold skin and mucous membrane irritants

4 Aggravating systemic factors e g chronic infections foc of infections parasitic infestations and blood dyscrasias

B Reli f of P ychic Di turbance In susc ptible individuals *emotional stress and strain may precipitate the lesions*

INTERTRIGO (code No 111-437)

Erythema due to chafing of the skin

Treatment

Treat as tin a cruris but do not use fu gicidal agents (see page 90)

MILIARIA (Heat Rash) (code No 153-445)

An acute de matitis characterized by small eryth matous burn ing, and often pruritic papules vesicles and pustules which occur most commonly on the upper extremities trunk and intertriginous r as it is caused by exposure to a hot moist environment

T tm nt
A General M asur s
1 Provid optimal working conditions when possible i e con trolled temperatu e ventil tion and humidity
2 Avoid ve b thing and use of strong irritating soaps
B Local Me ur s
1 Antipruriti cooling lotion apply b i d to q i d

℞ Menthol

Phe ol	1 0	gr xv
Glycerin	2 0	ss
Alcoh l, 35% q s ad	240 0	℥viii

2 Drying shak lotion (℞ 14 with 1% phe ol o ℞ 15 page 100)
3 Sulfur re orcinol lotion (for seborrheic kin) (℞ 20 page 101)
4 Antipruritic powd s or othe dusting powders (see page 99)
5 Treat s condary infections (pyoderma, superficial) with pota sium permanganate soaks comp esses or baths (s e pag 98) Ammoniated mercury 2 5% in a hydrophilic oint m nt (e page 103) may be employed advantageously
6 Tanni acid 10% in 70% al ohol locally b i d

Prophylaxis
A Toughe or tan skin G aded exposure (incr ased daily) to sun light or ult avi let light for individuals who will later be sub j cted to hot moist atmosphere
B Ge al Me s re (Se above)
C Avoid exposure to adv rse atmospheric onditions i r ext emely susceptible individuals

ANO-GENITAL PRURITUS
(Anl code No 143 573) (Vulvae code No 771 570)

Di gno is
A Consid r th r l of sy temic ca s s of pruritus anxiety at te d abet s i ich mon s inf ction and inte tin l parasites
B Rule out all obvious local pathological conditions of the anu and rectum bowel irregularities or local cutaneous diseases

T eatm nt (S e also Pruritus page 87)
A Ge e al M asu s
1 Diet Avoid hot spi y foods (e g hot peppe s or chili) and drugs which can irritate the anal mucos
2 Tre t constipation if pr s nt (see P ge 254)
3 Pr vid nec ssary proctologic t atment as indi t d
4 Instruct the p tient to us very soft or moistened ti cloth after a bowel movement and to cle n tho o ghly Wom n should apply ame p ecautions (tier u in (
5 Instruct the patient regarding harmful and p u ti

ff cts of scratching

B Loc l M asur
   1 Calamine lotion with 1% phenol applied locally
   2 Sitz baths b i d if the area is acutely inflamed and oozing, using 1 10 000 1 200 (0 01 0 5%) silver nitrate 1 10 000 (0 01%) potassium permanganate or 1 20 (5%) aluminum a bacetate solution
   3 Und rcl thing should be changed daily
   4 Control e cess perspiration by use of drying powd rs such as talc (s e page 99)
   5 *Paint fissured or ulcerated areas with 5 10% silver nitrate*
   6 1 2½% hydrocortisone ointment locally b i d
   7 X r y therapy may be used if other mea ures fail This should be reserved for the speci list

Prophylaxis

A Tr t all possible systemic or local auses

B Instruct the patient in proper ano g nital hygiene

CALLOSITIES (code No. 112-430) and
CORNS (of feet or toes code No 148-433)

Tr tment

A Corr ct m h i l bnorm liti s which cause friction and re*sult in the horny overgrowths*
   1 Shoes must be properly fitted
   2 Orthopedic deformities mu t be treated nd corrected

B R move Callosities By
   1 P aring of callu after warm water soaks
   2 *Keratolysis by use of chemical agents*
      a ℞ Salicylic acid 4 0 3i
         Acetone 4 0 3i
         Collodion q s ad 15 0 ss
         Sig Apply locally to callus every night and cover with a strip of adhesi e Remove adhesive in the morning Repeat until corn or callus is removed
      b Commercial salicylic acid corn plasters may be used
   3 *A metatarsal l ather bar ½ inch wide and ¼ inch high* may be placed on the outside of the shoe just behind the weight bearing surface of the sole

DRY SKIN (Congenital Senile or Environmental)

Treatment

A Gen ral I stru tion to Pati t
   1 Avoid ex essive bathing and use no soap Avoid undue drying irritating or keratolytic medicam nts avoid cold or dry environment
   2 Apply simple gre ses liberally to the skin while it is wet
      a Veg table *greases* coconut butter *vegetable cooking fats*
      b Animal greases hydrous wool fat (lanolin)
      c Liquid petrolatum (mineral oil) and petrolatum
      d Simple ointments (see pages 102 103)

3 So pl as detergents may be used when bathing but they may do mor h rm than good

B Gen ral M ea

1 Treat omplic ting d rmatoses (e g a alp ecz m and pyod mal by appropriate measures (see pag s 72 and 85)
2 Vitamin A in high doses (50 000 100 000 un ts da ly) has bee recomm nded but results re qu stionable

HERPES SIMPLEX (Cold or Fever Sore) (ode No 13 166)

An a ute viral inf ction appa ently prec p tat d by va ious ca es su h as f er infection, allergy ltraviolet radiation and psychic t uma The small grouped ves cles an c anywher b t are most frequent on the skin and mucous m mbra e of th face nose mo th throat and genitalia R g nal lymph nodes may be involved Atta ks are us a ly self limit d bu ar often r cu rent

Trea m t

For persis ent or severe recurrent herpes

A Ge ral Tr tm t

1 El minate precipitating ge ts when po bl
2 Routine sm llpox vac ination at weekly int als for 6 8 w ks Equi ocal results
3 Aur omycin® prob bly ex rts no ap if c a t on ag in t the primary l sions

B Loc l M s r

1 Dust v sicle twic daily with bismuth formic od d (BFI) powd r or use
   a. Shake lotions (℞ 14 15 page 100)
   b Spirits of camph r
   c Tincture of benzoin (℞ 47 p g 105)
2 Hydrocortisone ointment 1 2½% loc lly q i d s sa d t be of valu
3 Aur omy in® ey drops (0 %) lo ally tq yes may be of val in pati nts with de driti k ratitis
4 If there is associ t d cell litis nd lymphad nitis pply ool mpresses
5 T t stomatitis as outlined on pag 261
6 Us ray therapy in sele ted c ses Th q ir s dmin istr tion by xpert personn l

HERPES ZOSTER (Shingles) (code No 13 167)

An ac te esicular dermatitis of vi al or gin whi h has a char teristic distribution correspond ng to in l d p r ph r l sen sory ner es and t associated with v rious local ner e symptoms (euralg pruritus burn.ng and autonomi s so y or moto disturbanc s) Th int recost l n rves the sens ry ner s of the ext mities and the ophth lmic nerv s a most ommonly (i d vidually and unilat rally) invol ed but the erupti n m y be g r r lized (res mbling chi kenpox) Th conditi n is usually lf l and nonrecurrent, Though at t m s a p rsistent n ur lg

remain The disease may be precipitated by or may be a manifestation of chronic infections local trauma heavy m tal poisoning or lymphoblastomas

Treatm nt

A Ge r l M ur s

1 Sedation B rbiturates or bromid s may help control tension and nervousness associated with neuralgia
2 Analgesics Aspirin 0 65 Gm (10 gr) or aspirin compound with or without codeine phosphate 0 03 Gm ($\frac{1}{2}$ gr) will usually control the pain

B Local M ure

1 Wet dressings may be necessary for acute and extensive inflammatory lesions (see pages 93 99)
2 Calamine lotion or other shake lotions (see page 100) are often of value Apply lotion liberally and cover with a protective layer of cotton batting *Avoid greases*
3 X ray th rapy given by an expert may be helpful
4 ACTH gel, 40 mg I M daily for 3 days may relieve the pain.

LUPUS ERYTHEMATOSUS (code No 110 1x9)

Diagnosis

An a ute or chronic dermatitis of unknown origin manifested by two main clinical types

A Discoid Type Mild local, chronic eruption over nose and cheeks (butterfly pattern) with no constitutional symptoms
B D s minated Type A serious systemic disease which occurs in acute and chronic forms with or without discoid skin lesions and associated with fever weakness anemia, and e i dence of diffuse vascular lesions such as endocarditis arthritis and nephritis (see page 519 for diagnosis and treatment of *disseminat d type*)

Treatment

A G n ral Measur s

1 Perform complete medical study to rule out systemic lupus erythem tosus
   a Examine for chronic infe tions
   b Determine cardiac renal, and joint status
2 Provide protection from sunlight and all other powerful radiation *Do not use any form of radiation therapy*
3 Maintain optimal general h alth by well balanced adequate diet with suppl mentary vitamins and iron as indicated Insure adequate rest and pres ribe bed rest wh n the pati nt is febrile
4 Nonspecific therapy *for discoid type only*
   a Quinacrine hydrochloride (Atabrine®) 0 3 Gm (5 gr) orally daily for 2 weeks then 0 1 Gm ($1\frac{1}{2}$ gr) daily for 3 months or more
   b Chloroquine diphosph te 0 5 Gm ($7\frac{1}{2}$ gr) d ily for 1 week then 0 25 Gm (3 3/4 gr) daily watch for signs of to icity with both of th se drugs

B Loc l M s ures Tr at the existing stage of d rmatitis by appropriate measures (see pages 96 97 and 108)

INFECTIONS OF THE SKIN

ACUTE SUPERFICIAL INFECTIONS

Th acut s perficial inf tions includ the following

1 Impetigo contagiosa (code No 111 10)
2 Ecthyma (cod No 110 105 1)
3 Sy osis b rba (cod No 110 105 1)
4 Acute infectious ecz matoid dermatitis (code No 161 105)
5 Simple superficial pyoderma (cod No 1 100 1)
6 Secondary infection of other d rmatos s (code No 110 1005)

The off nding organism a e sually h molytic Staphylococcus aure s and/or the str ptococ i

T tment

A G l M su s Systemi anti infectives may be tried if the skin inf cti n is resistant to loc l t eatment if t is xt si or se e e and a mpanied by f b il r tio if it is com plicat d or if it in olves the so-called danger rea (g a ea of uppe lip no and eyes) (Refer to s tion on Antibiotic Therapy on page 514)

Penicillin in d ily dos g s of 300 000 unit I M n v nient and effecti for this p rp se but may b mod fi d in do age Oth antibiotic drugs may b substit t d a th in dividu l case d mand (se pag 514)

B Loc l M u s

1 Cleans a gently with mild olution of oap and w ter
2 Soaks or c mp ess to involv d a 15 min tes b i d (see pages 98 99)
3 When skin is soft ned by soak g tly op n la g r pu t les nd trim aw y necr tic ti sue
4 Local anti infecti e gents are of p d lu Thes m y be t i d individually until effe tiv ag nt i d termined all wing 3 4 d ys for evaluation They should be ppli d initi lly at night and protected by dr ssing soaks should be ppli d during the day Afte the ea ha l d any f th e pr p rations may be ppli d 2 4 tim s d ily
   a Aqueous omycin 1% locally q i d
   b Vi f m® ointm nt (iodochlorhyd oxyquin lin) 3% locally b i d

   Othe ntibi ti s al e or in combin tion as ointm nts locally b i d to q i d Th includ T ramycin® A eomycin® and polymyxin B in ombination with bacit cin or T mycin® neomycin hlor mph ni ol and rythromy in (s page 514)

5 Local agents ar of alue in t in c s but att nd d by incr s d i k of nsiti ti n reaction
   a Peni illin In orp ting 300 1 000 units/gram or in compress o p y s l tion or hyd ophil or othe ointm t b se (20% of individuals may be nsitiv) In gen al the topi l us of th s antibiotic drugs whi h m y b l able or e n life saving wh mploy d by systemic administ ti is to be cond mn d Up of individ l m y be n iti ed to th drug furth y t mic u e

b Sulfathiazole Urea powder
(1) ℞ Sulfathiazole powder 70 0 ʒiiss
Urea 30 0 ʒi
Sig Dust or rub in a small quantity locally
(2) Sulfathiazole 5% in starch lotion (B 15 page 100)
Shake well and apply locally to involved area

Prophylaxis
C r e t precipitating or aggravating factors syst mic causes (g diabet) or local causes (e g mechanical or chemical skin irritations dis harges et)

CHRONIC SECONDARY INFECTIONS

Det rmine all possible factors favoring hroni ity Obtain bacterial c ltures and det rmine organism sensitivity to antibiotic agents whenever possible

Tr tment
A G e l M s
1 Diet Well balanced and ad quate in proteins and vitamins
2 Consid r us of vigorous systemic anti inf ctive therapy
B Loc l M s ures
1 Use local m sures as for cut superficial infections
2 *Tr t underlying d rmatosis a ording to stage and type of* lesion (see pages 86 97 and 108)
3 Consid r x ray therapy if all other measures are ineffecti e This must be reserved for the specialist

ACUTE and CHRONIC INFECTIONS of SKIN APPENDAGES

Examine for local and systemic c uses of these infections particularly if they become severe or chronic The following dis orders are included
1 Folliculitis pustular (code No 161 yx2)
2 Furunculosis (code No 161 100 0)
3 Carbuncle (code No 18 100 3)
4 Hidradenitis (code No 152 100)

Tr tm nt
A G n r l M s ur Use systemic anti infe tive th rapy if le sions are s vere xtensive complicated or located in danger areas (bout neck and head)
B Loc l M res
1 Avoid over manipulation of inflamed are s
2 Use moist or dry heat to help larger lesions localize
3 Use proper surgic l incision, epilation or debrid ment *after* lesions are mature

COMPLICATIONS OF SKIN INFECTIONS

If p thogenic b cteria from inf ctions of the skin inv d deep r st uctur s on of th f llowing m y b produced and other more s rious infe tion may also occu

1 Cellulitis (cod No 18 100)
2 Acute lymphangitis (code N 54 100 1)
3 Ac t lymph d iti (cod No 55 100 1)

Tre tment

A Ge l M s r

1 B d r t w th immobili ation of affected extremity or part
2 Sy t mi anti infe tive g nt mu t be administered in ffective dos s (se page 514)
3 A alge ics a nece sary for pain (see page 56)

B Lo l M s

1 Immobili ation of aff cted part in lightly elevated position
2 Loc l h t t area using w rm moi t compre ses if ab ces s or p t l s ar pr sent Avoid mac ration of skin (use no occl ive covering)
3 Local anti inf cti age ts t open inf ted areas t night

FUNGAL INFECTIONS OF THE SKIN

GENERAL CONSIDERATIONS

Di gn sis

U ually based on

A Ch t i ti s d L ati of Lesion (Se de ription below)

B Labor t ry E min tion

1 D ct d m tr t on of fungi in 10% potassium r odium hyd o id p par tion f sc apings from su pect d lesions
2 C itur of o gani ms
3 Skin t sts (g T i hophytin) re not li ble
4 St ining of histol gic s tions with periodic-a id Schiff technic

T tm t

A Loc l M s r

1 Tr at c t acti fu g l infe tions initially as f r any cut d rmatitis (s e p ge 108) *It may be necessary to treat the dermatitis before instituting fungicidal medication*
2 Mo t fungi id l g nt t ong skin irritants *It is easy to overtreat AVOID this*

B G r l Meas nd P hyl is

1 Ke p kin d y M i t kin f vo the growth of fungi
   a Cool lim t wh n possibl is to b p fe d
   b E ssive p spir tion m st be void d R d e ci and tivities in h t of d y
   c Dry a f lly after b thing o aft pe pi ing
   d Socks and th r clothing hould be hang d a n s

e Sandals or open toed shoes should be worn as they permit adequate drying of f et
f Secretions of skin should be reduced or controlled
(1) General or systemic measures
(a) Sedatives in tense nervous patients Phenobarbital, 15 30 mg (1/4 1/2 gr) t i d to q i d
(b) Anhidrotic drugs (e g atropine) are usually inef fective
(2) Local m asures
(a) Talc or other drying powders (see page 99)
(b) Drying soaks (see pages 98 99)
g Toughen skin by graded daily sunbaths or by quartz lamp treatment
2 Foci of fungal infections should be eradicated or controlled
a Treat nails umbilicus groin webs of toes and other areas where fungi are found
b Group or community showers or bathing places unless strictly supervised should be avoided

TINEA CAPITIS (Ringworm of Scalp) (code No 182 211)

This contagious sometimes epidemic condition occurs almost exclusively in children It is very persistent but clears spont ne ously at puberty The lesions are originally red and scaling and result in circular areas of alopecia Fluorescence under the Wood light is characteristic in Microsporon infections (90% of cases) There is often a history of contact with infected indi iduals or hous hold pets

Treatment
A Gen ral M ur None
B Loc l Specific M u e It may require 2 months or more to cure the disease The human type is more difficult to cur than the animal type (dogs and cats)
1 Scalp cleansing and preparation (Not ess ntial.)
a Clip hair closely every 2 weeks and have patient wear a clean stocking cap or skull cap for prot ction
b Wash scalp as necessary
2 Fungicidal salves Rub these well into scalp morning and night after scalp has been washed
a Salicylanilide 5% in Carbowax 1500® ointment
b Benzoic acid and salicylic acid ointment (Whitfield s) *one-half strength* (§ 34 pag 104)
c Sulfur salicylic acid ointment (§ 38 page 104)
3 Epil tion Use Westinghouse 250 Watt purple X lamp to demonstrate fluoresc nt infect d hairs Remove infected hairs daily by twe zers or by adhesive tape t chnic
4 X r ys may be used effecti ely and may work when chemical and mechanical measur s fail X ray therapy must be given by trained personnel only Do not re epilate with x rays

rophyla is
A Indi I L
1 Exchange of he dgear must be avoided

2 Inf ct d individuals or household pet must be vigorously tre t d and re examined for d termination of cure
3 Scalp mu t p washed after ba ber shop haircuts

B Group
1 Routine school surveys may be advisable
2 Epidemic pre utions
a Wood light xamination of students l ss than 15 years old
b I ol tion of infected individ l in special cl ssrooms
c Careful f ll w p of infected i divid als and periodic re e min tion f all children until all cases are cu ed
d Ed cation of barbers reg rding handling of i f ct d individ ls

PITYRIASIS VERSICOLOR OR TINEA VERSICOLOR
(code No 112 208)

A mild cond tion chara te ized by tan or pinkish, very fine scal ing m ules f vari ble siz s only mildly pruritic usu lly found on the ppe trunk H aled are s rem in depigmented for a f w months

T tm t
A G r l M s Encou ge normal skin hygie e
B Spe ific M r s One of the following may be used
1 Sod m th lf t 10% aqueous sol tion b i d
2 Mild Wh tfi ld ointment 1/4 1/2 str gth (R 34 p ge 104) t bedtime

TINEA CORPORIS OR TINEA CIRCINATA
(Body Ringworm) (code No 130 211)

Body ingwo m is h ra te i ed by single or multiple (relative ly few) aly p pule i cular in hape with le r c tral area and with min te vesicle in the acti ely sp e ding periphery they a e found most omm ly on the t unk neck and limbs Lesions occ occasio lly a thick pigm nt d p t h Diagnosis should be conf rmed by demonstration of th fungi

T tm t
A G l M s (S p g 87)
B Loc l M *Avoid ove treatment*
1 T t th p ope stage of th d matosi (e 96 to 97 108)
2 Fungi id l g ts
a ℞ S licyli a id 0 3 gr v
S lfur ppt 0 6 gr x
Hyd phili ointment
q s ad 30 0 i
Sig Locally b i d
b Zincundec t (und yle ic acid and zi c u d cyl t) intme t m y be u d in the less chroni a d non thi ke ed l ions

P ophyl i
A S G al Measure on page 87
B Avoid conta t with infe t d h hold pet
C Avoid e hang of lothing without d qu t laund ring

USEFUL MEDICATIONS FOR SKIN DISEASES

Name	A tion	Pr scription	Te hni
A S arch and soda b ths	Cle nsing and soot g	[illegible]	[illegible]
B Cool wet dressing Bor Acid U S P B P	Cooling soothing [illegible]	1 Tb p to 1 pt [illegible]	[illegible]
b Al mi um Acetat U S 1	Cl nsing m dly a tring nt	[illegible]	[illegible]
c Pota ium P rm ganate U S 1 B P	Deod r i g	On 0 3 Gm [illegible] dissolved in 1 qt [illegible] warm water	[illegible]
C Hot w t dressings M gn ium S lf t U S P B P	Promot s b ood fl w Locali inf tion and [illegible] phagocytos	Tb p to 1 [illegible] of h t w ter	Apply a bove u ing w [illegible] t kish towel
D Starch U S P B P (Add 5% d te g nt lution of coal t)	Soothing a d dry g (K atop) all and h ling)	R tarch 8 [illegible] Zinc o ide 36 [illegible] G y n 18 [illegible] Lim w t r q s d 180 [illegible]	Apply with [illegible]

N m	A t	P s pt on	T hn c
E Hyd ophil Ointm t U S P	V h l f w t l bl m d t F p b h F sg d F m	O m y dd 5% mm t d m y 1% al yl d 3% ulfu 5% d t rg nt l ti f l t	Apply sp i gly w th fingertip b i d
F 5% S l ylanil d N F in C bowax 1500®	Fo ti p t s	D p n 60 Gm o ß (intm t)	L ally b d to ti lp (It s ot e ry to cl p th h i)
G Kw ll® intm t (h hlo y l h ane)	F r s bie d p d ul is	D p 30 Gm	L ally b d fo l t 3 d ys
H Aq my in (0 1 %)	F pyod m	℞ N my n 0 12 gr D t lled w t q d 120 0 i	Apply with c tt b d to q i d
I Methyl lin Chlo d U S P (G ntian i l t)	Fo m nil i	D pe 30 i of 1% aq o s l t	P int o with ppl cator o e d ily
J P a am b o c A d U S P emul on b (10%)	P t t f m tinu r ys	D sp ns 60 Gm o	Apply to po d u f s ach morn ing
K La P t (Z O d P t N F)	P t t and s thing	D p s 30 Gm i	Locally b i d

METHODS OF LOCAL TREATMENT OF VARIOUS TYPES OF SKIN LESIONS

Type of Skin Lesion	Example	Methods of Local Treatment Always treat the stage as well as type of dermatitis
1 Macules		
Simple erythema (asymptomatic)	Drug erythema	Soothing wet dressings or shake lotions
Burning erythema	Sunburn	
2 Papules		
Maculopapular lesions	Pityriasis rosea	Mild keratoplastic lotions and ointments
Papulosquamous lesions acute	Psoriasis	Soothing wet dressings or shake lotions
chronic	Psoriasis	Keratoplastic and later keratolytic agents
Acneiform lesions	Acne vulgaris	Keratolytic and astringent agents
Lichenified lesions	Lichen planus	Keratoplastic and, later keratolytic agents
Verrucous lesions	Verruca vulgaris	Keratolytic and caustic agents
3 Vesicles		
Multiple vesicles or diffuse weeping lesions	Eczema	Soothing wet dressings during daytime and shake lotions or pastes at night. As process subsides change to pastes and creams
Herpetiform lesions	Herpes zoster	Shake lotions or wet dressings
Bullae	Pemphigus	Wet dressings, debridement, shake lotions
4 Pustules		
Impetiginous	Impetigo	Wet dressings, debridement, anti infective powders, solutions and ointments
Ecthymatoid	Ecthyma	Wet dressings, debridement, anti infective powders, solutions and ointments
Furunculoid	Furunculosis	Warm moist compresses, incision (only when ripe) and drainage (caution on lips, nose, lip)
Folliculitis	Sycosis barbae	Wet dressings, anti infective solutions and ointments [illegible]

Type of Skin Lesion	Example	M thods of Loc l Tr atm nt Alway tre t th st g as w ll as typ of d matitis
5 Ulcers Simpl superfi ial Deep py ge i D p no pyog	Simple o i ti n Tr pl al ul er Tr ph l r	Wet dr ssing anti nf ti e soluti ns and ointment Wet d essing anti infective s lutions and ointments Wet d es ings anti inf cti sol tion and intments
6 U ti r'al l s'o Simple wh als Anglon ur tic d ma	Hiv A g on uroti d m	Antip uriti oothi g baths and sh k lotio s
7 Fi u s	S mpl fi su e	Sil r nitr te a ti ppli tions and intments (a id wet d s i g)
8 E t d l i S r s cr st Inf t d r t	Ecz m Imp tigo	W t dr si gs debrid m nt follow with hak lotions and gre se l ss ointm t W t d es i gs d bridement foll w with anti inf ti e solutio s and oi tm t
9 De q amating l sions Adh re t s al s N n adherent c les (xf liating) G sy les	P oriasis E f liativ dermatitis S bo h	Ker tolyti and l ter ker topla tic agents Wet dr ss ng baths shak lotion mulsions and later gr as less ointm nts K at pla tic ge ts
10 M r t d le s	Intertr go	W t d s g shak l t and p wders

SIMPLE SOLUTIONS FOR SOAKS AND WET DRESSINGS

Indications: For [illegible] [illegible] itching [illegible] [illegible] vesicular lesions

T[illegible]: Solutions must be applied cool (hot for infections)

(1) Basin soaks (2 3 quarts of solution) for [illegible] and feet [illegible] hour b i d

(2) Wet dressings for localized [illegible] [illegible] turkish towel [illegible] saturated with solution

(a) Open dressings for very acute lesions and when marked [illegible] and soothing action is desired. Frequent applications are necessary ([illegible] for ½ hour b i d to q i d)

(b) Covered dressings should not be used

[illegible] the solution [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

Agent	Action	Range of Concentrations Used	Most Commonly Strength Used	Preparation of Solution of Most Commonly Employed Strength
Plain tap water	(See above)			
℞ 1 Sodium Chloride U S P B P	(See above)	6 1 000 15 1 000 (0 6% [illegible] %)	0 9%	2¼ dr (2 tsp) NaCl to 1 qt water or 9 Gm NaCl to 1 liter water
℞ [illegible] Sodium Bicarbonate U S P B P	Antipruritic	1 50 1 20 ([illegible] % [illegible] %)	3 0%	7½ dr (8 tsp) NaHCO₃ to 1 qt water or 30 Gm NaHCO₃ to 1 liter water
℞ 3 Boric Acid U S P B P	Antipruritic	1 [illegible] 0 1 25 ([illegible] % 4 [illegible])	3 0%	7½ dr (8 tsp) H₃BO₃ to 1 qt water or 30 Gm H₃BO₃ to 1 liter water
℞ 4 Magnesium Sulfate U S P B P	Antipruritic	1 [illegible] 0 1 25 ([illegible] 4[illegible])	3 0%	7½ dr (8 tsp) NaHCO₃ to 1 qt water or 30 Gm NaHCO₃ to 1 liter water
℞ 5 Aluminum Subacetate S[illegible] N F	Astringent	1 200 1 10 (0 5% 10 0%)	5 0%	4 Domeboro [illegible] tablets or 50 [illegible] c Burow's Sol (N F) to 1 qt or 1 liter water
℞ 6 Silver Nitrate U S P B P	Astringent Antiseptic	1 10 000 1 200 (0 01% 0 5%)	1 400 0 2 %	10 [illegible] c of 25% AgNO₃ solution or [illegible] 5 Gm AgNO₃ to 1 qt or 1 liter of water

Agent	Action	Range of Concentrations Used	Most Common Strength Used	Preparation of Solution of Most Commonly Employed Strength
℞ 7 Mercury Bichloride N.F., B.P.	Astringent, *Antiseptic*	1:10,000–1:1,000 (0.01%–0.1%)	1:1,000 0.1%	One 1.0 Gm. (15 gr.) tablet $HgCl_2$ to 1 qt. or 1 liter water. *Poison. Do not use on denuded areas*
℞ 8 Potassium Permanganate U.S.P., B.P.	Antipruritic, Oxidizing, Antiseptic, *Astringent*	1:10,000–1:400 (0.01%–0.25%)	1:10,000 0.01%	One 0.3 Gm. (5 gr.) tablet $KMnO_4$ to 3 qt. or 3 liters water, or 0.1 Gm. (1½ gr.) $KMnO_4$ to 1 qt. or 1 liter water

POWDERS

Name	Prescription	Instructions and Remarks
℞ 9 Starch U.S.P., N.F., B.P.		Readily available all purpose drying soothing powder. Add boric acid 10 to 50% as antiseptic
℞ 10 Talc U.S.P. (talcum)		Simple dusting powder
℞ 11 Foot powder, simple	℞ Salicylic acid 1 0 g Boric acid 1 0 gr Talcum 100 0	Simple powder
℞ 12 Dusting powder, antipruritic	℞ Camphor, powdered 2 0 6 0 3 s is Zinc oxide, powdered 16 0 i Starch powder q.s. ad 100 0 x	Simple antipruritic powder
℞ 13 DDT (Dichloro-diphenyl-trichloroethane)	℞ DDT 10 0 3iis Talc q.s. ad 100 0 xxv	Sig.: Apply ½ to 1 oz. over the entire surface of underwear and treat seams on inside of shirts and trousers Remarks: Effective against all pediculi

OINTMENT BASES

Indication

1. To correct fat deficiency in a dry skin
2. To provide mechanical protection to the underlying lesions
3. To help absorb or imbibe transudates from underlying lesions (This holds true only for the hydrophilic preparation)
4. To apply a [illegible] medicinal agents to the skin

Contraindication

1. Acute inflam[illegible] oozing lesions. Hairy areas (except the hydrophilic preparations)

Preparation	Description	Pharmacological Properties
OINTMENTS		
℞ 4 Petrolatum white U S P White soft paraffin B P		
℞ 2 Petrolatum hydrophilic [illegible] U S P	[illegible] in petrolatum wool fat white wax and [illegible]	Chemically inert [illegible] evaporation from skin [illegible] in some cases [illegible]
℞ 26 Wool fat hydrous U S P B P (Lanolin)		ments Imbibes water (hydrophilic)
℞ 27 Wool fat U S P B P (Anhydrous [illegible])		Adheres well to skin [illegible] favorable [illegible] Water [illegible]
℞ 28 Zinc oxide ointment U S P B P	20% zinc oxide in liquid petrolatum wool fat [illegible] and white petrolatum	Imbibe water [illegible] penetration [illegible] Mechanical protection [illegible] stiff as ointment [illegible] body to ointment) [illegible]
℞ 29 Theobroma oil U S P B P (Cocoa butter)		M[illegible] body temperature

P p t	P pt			Ph m l g l P ɩ t
CREAMS (C t ın w t)	Ad t ge M ft	g and	th g th u	tm t
℞ 30 Hyd ph ll O tm t U S P	℞ M thylp b Pr pylp b S d m l yl s lf te Gly rin St yl l hol Wh t p t l t m W t q d	0 025 0 015 1 0 12 0 25 0 5 0 100 0	g 3/8 g 1/4 gr i 3vı 3vı	F v r p t t n imb b wate g od hi l f w te l bl medi m t
℞ 31 R w t r O tm nt U S P	℞ Sp m t Wh t w E p d lmo d o l S di m b te R t D t ll d w t R il	12 12 0 56 0 0 5 5 0 14 0 0 02	3 i 3iii 3 i gr ss i1/4 3iii s ɱ1/3	C ld m (w t r l) lıng a d so th g effect
℞ 32 Em l i b se	℞ Dup l᷈ C C tyl l h l St yl l hol Wh te pet l t m H vy l q d p trol tum B t b ® D st lled wat r q d	1 6 7 0 7 0 20 0 2 0 0 05 100 0	g v 3i3/4 i3/4 v 3 gr 3/4 xxv	No h tıng d o t t ng Le m ssy than oth r cre ms and t m nt
PASTES (H gh p wd t t) P m t ap t d ol g d ase v s) l t n				
℞ 33 Z U d P t N F (L s r s P t)	℞ Z c xıd St h P t latum whit q d	5 0 25 0 100 0	3 3	M han i p te t l c e adhe i but d r pen tr tio of m dicame t (Add 2% h l s t l or 5% tyl alcohol to ın re w t mb b g p w)

OINTMENTS, MISCELLANEOUS STANDARD PRESCRIPTIONS

Common Name	Prescriptions	Instructions and Remarks
℞ 34 Ointment of Benzoic and Salicylic Acid N F (Whitfield's)	℞ Salicylic acid 6 0 [illegible] Benzoic acid 12 0 iii Wool fat 5 0 i Petrolatum q s ad 100 0 xxv	Sig Apply [illegible] Remarks [illegible] fungicide Often best prescribed in ½ [illegible] strength
℞ 35 Aluminum acetate ointment (1 2 3)	℞ Alum acetate Sol N F 10 0 iiss Wool fat 0 0 3v Zinc oxide paste 30 0 3i	Sig Apply locally to skin p r n Remarks Valuable on receding inflammatory processes
℞ 36 Sulfur salicylic acid ointment	℞ Sulfur 1 0 3 0 gr xv xlv Salicylic acid 1 0 3 0 gr xv xlv Petrolatum q s ad 100 0 xxv	Sig Apply locally to skin p r n Remarks [illegible] fungicidal combination [illegible]
℞ 37 Calamine cream	℞ Hydrophilic ointment U S P 33 0 3viii Calamine lotion 66 0 xvi	Sig Apply locally to skin, p r n Remarks Good general purpose cream Useful vehicle for water soluble agents
℞ 38 Ammon mercury ointment	℞ Ammon mercury 5 0 gr lxxv Petrolatum q s ad 100 0 xxv	Sig Apply locally to skin p r n. Remarks For seborrheic dermatitis and psoriasis
℞ 39 Kaolin and sulfur ointment	℞ Kaolin 10 0 iiss Sulfur ppt 10 0 iiss Zinc oxide oint q s ad 100 0 xxv	Sig Apply locally at bedtime Remarks A good substitute exfoliating paste for acne
℞ 40 H chlorocyclohexane (Kwell®) ointment	℞ Kwell® ointment 60 0 3ii	Sig Apply as directed Remarks [illegible] scabicide

SOLUTIONS TINCTURES AND PAINTS

N m	Pr ripti	Rem ks
℞ 41 M thylro li Chl d U S P (G tian vi let) Cry tal V let B P	1 0% aqu o l ti	Anti pti (gram positi e gan ms) and fungi id (m ilia)
℞ 42 S d m Thi lf t U S P	10% q o s l t n	Fung id (sp lly T s l)
℞ 43 S l e N t i U S P B P	1 10% q e l t	Us f l c t g and t ing t olu tf f f r s nd) rs
℞ 44 Ch y b U S P	4% in hlo oform	Fo monil al p ny hia
℞ 45 N t m l N F (M t ph ®)	0 5% (1 "00 t ctu)	B te iostat c and g rm d l agent
℞ 46 Al h l Wh tf ld l tl n	℞ S l yl d 2 0 3 B ol acid 4 0 3i Al h l 40% q d 120 0 3i	Apply lo ally t kin *Eff ctive fungi idal combin t n* May betitut b y um f alcohol
℞ 47 B n Compound Tinctu f, U S P , B P	F ll st gth	Us f l c t g rn s t r abr d d fi u ed or ul ted a ea
℞ 48 Soft S p Linim nt U S P L n m t f S p B P	U S P 65% p B P 8% soap (lso k wn as t t f g so p)	Usef l d te g t
℞ 49 T th l mine m lsio	℞ T than lamin 4 0 Ol c a id 8 0 3i Mi al oil q s d 100 0 3 x	Add up to f part f wat to m k shampoo
℞ 50 C tellan s p t	℞ B c fu hs turat d l holi oluti n 10 0 3i ss Phe l 5% aqu s S l 100 0 3xx Filt the add B ic cid 1 0 g xv 2 hou s lat Aceton 5 0 11/4 After 2 h rs Re o cinol 10 0 3uss	Co v n e t m t p rpose ar e tic and fungicidal pai t Pr f rably begin with 1/3 dilution then p gress to 1/2 dil tion and fin lly t full t ength if ne ssary CAUTION k p in dark stopp red b ttl

DERMATOLOGIC MEDICAMENTS

The following [illegible] may be [illegible] in combination in the lotions, emulsions [illegible] listed on pages 100 and 102. In general [illegible] make prescriptions as simple as possible [illegible] calculated [illegible] only [illegible] different [illegible] and [illegible] 3% [illegible] and [illegible] (5-10%). Often, [illegible] (For [illegible] strength [illegible] (Camphor [illegible] (e.g. [illegible] Calamine [illegible] [illegible] [illegible] [illegible] Ag [illegible] will [illegible] [illegible] usually [illegible] begin with [illegible] and [illegible]

Type	Medicament	Concentration
ASTRINGENT and DRYING (For [illegible] and [illegible] eruptions.) These [illegible] by drying [illegible] the skin. [illegible]	A[illegible]	[illegible]
	[illegible] Subacetate [illegible] U.S.P. [illegible]	[illegible]
	[illegible] A [illegible] U.S.P. [illegible] B.P.	3 [illegible]
	Calamine [illegible] U.S.P.	4%
	[illegible] N.F. [illegible] B.P.	17%
	[illegible] Acid U.S.P. [illegible]	10%
	T[illegible] Acid U.S.P. [illegible]	2 [illegible] %
	Zinc Oxide U.S.P. [illegible]	1 [illegible] %
	[illegible] U.S.P. [illegible]	20 [illegible]
KERATOPLASTIC and MILDLY STIMULATING (For [illegible] and [illegible] eruptions.) These [illegible] of the skin [illegible] inflammatory [illegible] and [illegible] the [illegible] of the skin	Ammoniated [illegible] U.S.P. [illegible]	2 [illegible] %
	A[illegible] N.F. [illegible]	2 [illegible] %
	[illegible] N.F. [illegible]	1 [illegible] 3 [illegible] %
	[illegible] U.S.P. [illegible]	[illegible] %
	[illegible] U.S.P. [illegible]	[illegible]
	S[illegible] Acid U.S.P. [illegible]	0.25 [illegible] %
	Sulfur [illegible] U.S.P. [illegible]	4 [illegible] %
	T[illegible] U.S.P. [illegible] N.F. [illegible]	1 [illegible] %
	Coal Tar U.S.P. [illegible]	[illegible] %
	(Tar [illegible]) Juniper Tar U.S.P. [illegible]	0.5 [illegible] %

STIMULATING d/ KERATOLYTIC (F hr i pt) Th g t t by d l ing th h y l y of th kl d by movi g f d b l by d q m tl Th y ls i c k n s l ity	Amm i t d M y U S I B P	
	A th li N F (f f i)	5 10%
	Ch y ob n U S P	0 5 1 0% (C t)
	R l, U S P, B P	0 5 10% (C t o)
	S l l A id, U S I B P	5 10% (Up to 40%)
	S lf P p ted, U S P, B P	6 10%
	T C l T S l t f N F B P	6 10%
	C l T U S P (I pa d C l T B P) Pi T U S P	10 0%
	(T B P) J p r T U S P (Oil f C d B P)	
BACTERICIDAL	Amm t d M y U S P B I	5 20%
	I d hl h d yqu U S I (V f m®)	2 10%
	P lll S d m U S P P ll B P	2 3%
	S lf d S lf th l U S P B P (tl)	100 10 000 U /Gm
	T amyc ® A omy ® (t)	5 0%
	N omy in E yth my Chlo mph l U S P	3%
	P lymyx B w h B c t (Poly p ®) T my ®	1%
FUNGICIDAL	B A d U S P B P	
	S l ylc A id U S P B P	3 1%
	S lf P p t t d U S I B P	3 10%
	Z d te N N R	3 10%
	Sod m P p t , N F	5 10%
PARASITICIDAL	D hl od ph ylt hlo oeth (DDT)	5 15% Oi tm t
	B yl B t U S P B P	5 10%
	S lfu P p tated U S P B P	15 30%
ANTIPRURITIC F n n p c f l f of t h g Alw y d t rmin ca s f p t f t	C mph Sp t f U S P B P	3 10%
	C l T S l t f N F	1 4%
	Ethyl Am ob o t U S P B P (B zoc in)	3 15%
	Hyd ocort N N R	5 10%
	M th l U S P, B P	1 2 5%
	Ph l, U S P, B P	0 25 1%
	S li yli A id U S P B P	0 5 %
		1 2%

GENERAL RULES GOVERNING CHOICE OF TREATMENT OF VARIOUS STAGES OF DERMATOSES

Stage	Recommended Medicaments		Page
ACUTE LESIONS Characteristics Recent onset, red, burning, swollen, itching, blistering, and oozing	Wet preparations	Soaks For lesions localized to extremities	92
		Wet dressings For localized lesions of head, neck, trunk or extremities	98
		Baths For generalized lesions	97
SUBACUTE LESIONS Characteristics Intermediate duration, subsiding lesions and less angry in appearance	Shake lotions		100
	Emulsion		100
	Hydrophilic Ointments		101
	Pastes		101
	(high powder content)		
CHRONIC LESIONS Characteristics Longer duration, quiescent, thickened, encrusted, fissured and scaly	Creams (oil in water)	Cold creams	101
		Vanishing creams	102
	Greasy Ointment		104

Exact directions for choice of treatment will vary with the individual case. This will depend upon a wide variety of factors, including characteristics of the dermatosis, extent of lesions, general character of patient's skin, previous medication and drug allergies.

Chapter 6

DISEASES OF THE RESPIRATORY SYSTEM

UPPER RESPIRATORY INFECTIONS

THE COMMON COLD (code No 300 100)

The common cold i b nign infl mm t n of the m us m m b an f th pp spir tory t t Part o ll f th pper p g m y be affected d th ma ifestati ns will va y with th a in l d th e ty of the inf t and the p n e of mplic t ons The eti l gy h not b e dete min d b t a vi u is f q tly sugg st d as the pos ibl u

Th di g oft n m d by x l sion C ld m st b d ffer e tiat d f om the early stages f many f th mmunicable dise wh h h a imil t On j st f d in p ki g of the mmon ld o n n p f inf t nly wh no specific rgan m an b found and th d as r main loc li d

A L 1 M nif t t On ally fi d fl mm tion of the mu s m mb an of the in olved a e

1 Ac te Rh tis (od N 310 100) N s l o g tion d d h g

A t Ph yngitis (c de No 631 100) So th t w th p in on w llow g

3 Ac te La yngitis (c d N 330 100) H a p in on w ll wi g and at tim s dry o gh

B G 1 M if t t Mal ise g n l d a hes a d pains w t g and us lly a mild f v

T tm t

No sp if c t tm t known

A Ge 1 M

1 Re t In g al ad qu t est p efe ably compl te bed t f r th f t 24 48 hou s s of utmost importan in th rapy P t ts us lly f l mu h b tt and th dang of ompl ti s pp tly dimi i h d by thi gimen

2 Fluid P t t h ld be our ged to d ink fluids suf fi i nt to pr t d hyd atio and to m intai a normal in output Th i no evide c th t th ou f th d m y b i fl ed in y way by f ing fl id to p mot diu es s by ind c ng d aphor

3 D et A p lat ble well bal d di t i t be p fer d p ci l d ets and f ti g gime do ot influ n r lt the ou f th d s

Throat sw b Swabbing th thro t w th n a tisept c agent is v lu l ss in ombating infe t on or alt ri g th o rs of th d ase and may be harmf l Str g a tis pti s may b p otein pr pitant producing n roti tissue whi h c n act as ltu e med um f r p thog lc o g nisms W ak r s l t on are wa h d way in a matte of mi ute

3 Ga gli g nd th oat ir igat Thes a e of l tti lu in affe ting th d but the f t of warm non ir itati g g rgl o i igation m y gi e marked tr n i t el ef of p in in c s s f a ut pharyngitis Soluti ns ommeni d fo s a e otonic salt sol t on (1 tsp salt p qt or 1 t r of w t r) o 5 20% glu s in wat (1 4 t p gl os o K o% syrup p r cup o 240 cc of w te)

C Cough M d tion The cough ass ciat d w th n pp r i i y inf ct i u lly cau ed by d y ess a d inflammat on of the po te i r ph rynx d ppe tr he A su h it r p es nts a physiol gi l p ote ti e me hanism ag t dow w d drain ge f inf t d m te l usu lly qui es no the py and should n ve b ab lish d compl t ly It m y be upp e s d if it s too exhau ting painful p event l p is ont d t d b au of o iating nd t ons (g imm d t ly post p r ti ly) It an b ll viated upp s d by a n mb r of m as res

1 Volunta y supp e s n f th ough w ll u lly p e ent mu h f th oughi g
2 S g lo ng s (ough drops) u u lly oothi g to th thr t
3 Inh lation of w rm m ist air (t m) is usu lly e y th ing Compound B z n T n t r U S P 1 tsp m y b add d to a h q rt of wate b t it s the m st a r rathe tha ny medi at o th t gives r l f
4 D ug fo s ough
   Cod in Ph sph t U S P i th d ug of ho It h uld b giv n al in suff i nt dosag to suppr s b t not to abol sh cough Usu l do f th s 8 15 mg (1/8 1/4 gr) o ally ry 2 4 ho s p n
   b E pe torant co gh mi t r s It q ubtful if any of th exp to a t ough m d cin s h y ff t r i as ing th br n hial s et on or ll ing th i c d ty of th m cus S m of the sy upy o gh mi tu s have tem po a y oothing tion th o pha ynx b t b tt d m p olo ged It a btai d w th w et d loze g (cough d op) Th gh mi t incl d T rpin H d ate Elix N F yrup f mmon um hlo rid Sy p of Tol U S P Syr p of W ld Ch rry U S P etc Th a tion f odeine not e han d in y w y when it is add d to th mixtu and it an w ll b g n in t bl t f m

D Loc l H t Mark d rel ef in th no e and thro t an ft n b bt ined f om et m inh lat or xpo t w rm th (a h t w t bottl o i fr r d l mp v r th a al gion)

T tm t of C mplic t

The p ncip l complic tion of th omm ld r e t n on t ac sso y stru t s in d t c ta t w th th upp r p t y p s ges or secondary b ct lal nv s o f th m o s m mb

and access ry structures These usually req ire ant biotics or sul fonamides and may require the attention of an otolaryngologist

I rophylaxi

The principal prey y axis is similar to that of any contagious diseas avoidance of e posure whenever possible avoidance of sudden cha g s of temperature and excessive fatigue Admini tra tion of larg doses of any of the vitamins cold vaccines orally or by i jection g mma globulin or "hardening up have all proved val e less in preventing or in altering the course of the disease

ACUTE SINUSITIS (code No 32 130)

The acute infection of the paranasal sinuses following upper respiratory infe tions is usually caused by s condary bacterial in vaders The in ecting organisms most frequently are streptococci st phylococci or pn umococ i

Tr atm nt

A Specific M sur

1 Pen cillin is the drug of choice since most of the organisms are penicillin s nsitive It is administered as follows 300 000 units penicillin procaine I M once or twice daily Oth r wise spectrum antibiotics may also be employed
2 Local administration of penicillin and other antibiotics by *nose drops* and use of *negative pressure* is still difficult to evaluat

B Gen ral M s re

1 Bed r st
2 Local ext rnal heat over the sinuses
3 *Analgesics* *Aspirin* or *codeine* may be used
4 Vasoconstri tor drugs Non irritating nose drops may be used to facilitate drainage or drugs may be given in tablet form by mouth for similar eff ct (see page 110)

C Do not u e i strum nts in sinuses during acute sinusitis

EPISTAXIS (code No 301)

Epistaxis or nosebleed may be due to a variety of disea es or disorders

A Predisposing F tors Blood dyscrasias hypertension arteriosclerosis proth ombin deficiency (e g cirrhosis of the liver) nasal ulceration nasal angioma and certain of the infectious diseases (e g measles and rheumatic fever)

B Precipitating Factors External trauma to the nose violent blowing of th nose sneezing picking of nose increase of existing high blood pressure or lowering of atmospheric pressure

C Loc tion, The bleeding site is most frequently on the anterior portion of the nasal septum less often at the end of the inferior and middle turbinates and rarely further posteriorly

Tr tm nt

A L l M re H p tient sit re t w th h ad forward If r clinirg th re s dange of aspi tion of blo d

1 Pr ssu ov r th bl ding lt is usu lly all that is n s a y A sm ll pl dget of cotton mo stened w th hydrog n p oxid w ll usu lly top the bleeding

2 C te ation Wh n active bl eding h s c se i to chi g the bl eding point with be d of hromium tri xid (chromic d) t hlo cet a id w ll u u lly pre nt furth r ble dung El ctro a t y i ls ti f ct y

3 S re ble di g in th ant or p rt f the no can u ually b ont oll d w th a tampon int odu d th ugh th tril If bl eding i po t ri it may b ne ssa y to intr du a post or nasal pa k This i done by the use of two st ing att hing on string ne h nd of a olled 2 x 2 o 4 x 4 g uze pad A th rd st ing i tied at th m ddle of the r ll d p d A soft athet r i then introduced into the n soph ynx through o no tr l and pull d out through the r uth Th e d of one f the f st two st ings i tied to th o l po tion of th catheter and pulled b ck thro igh the st l Th tring s th rem v d from the cath ter and the procedure r p ated p lling th ond string through th oth no tril The p k s guid d th ugh th mo th into the n sopha ynx and pull d int pl by t t o both st ing Th a th tied v a p d under the nasal s ptum Th th rd str g i tap d to th face a d us d late to r m v the pack Do t le p k in m r than 48 hour

4 l p k on th no or t the b k f ne k are f no b efit

B Sp fi M r Tre t the und ly g di as

ACUTE TONSILLITIS (code No 634 100)

Acute t nsillit s i an inf cti of th f ial tonsils ca s d by any of a number of o gan ms It i h ra t i d by both loc l and g n raliz d sympt m f varying d gr

T tm t

D p ds on the c usal gani m (Fo st pt o so th o t s pag 459)

ALLERGIC RHINITIS (Hay Fever) (code No 310 392)

H y f v is an alle g c di rd whi h usually ur n sp ng o mme and s charact i ed by rhin tis sne i g n s l b str tion dn ss f y s and it hing of ear no thro t or ey Pollens a th m t ommon all g ns

Tr tm nt

A Sp f c M u The s o true sp if c t tm t Hypo n t t o d t tion i freque tly b nef cial and on ist of admini t t on of g d ally inc sing doses of th ll g n (su lly poll n) so as to indu an immun ty in th s ptibl ind vidu l Fo b t sult the py sh ld be started 3 6 month b f e th ons t of the hay fev r ason o

with a b b turate e y 4 to 6 hou s may g v el f (s page 110)

d S d t on may be of v l e f p t nt i ne vou o up t (se pag 35)

2 Alle g n f e atm sph re

Du t pr of spt to m sk can be sed du ing th hay f r s s

b Ai cond t oning equipment to filte the ai rt ing th p t nt o m m y p valu bl

An ar a fr of the ffe d g poll n can b i t d du i g th p ll t ng pe iod

d Du t p f b d oom i useful wh d t i th off nding g nt

(1) Co m tt s d p llow with all rg f o e

( ) R m all ugs p t d p bed p ds o oth r l t p odu ing mat l

(3) R m all f y fu n t o obj ts whi h a not ly dust d

DISEASES OF THE BRONCHI

ACUTE TRACHEOBRONCHITIS

(Tracheitis code No 340 100) (Bronchitis code No 350 100)

A a ut n nsp f flamm t of th t a h b hial t e u lly f llowing n a ut hin ti ph y g t s nd usu lly a com pan d by a low g ad f v A p odu t e or non p od t ugh p e t Phy l exam n t n m y b t ely n g t ve o s tte d a s hon hi m y b h a d th h st

T tm t

A Sp I M s

1 Th r o p f t tm t l ndary f t p s nt

I v cas p n ll by ae os l h l t (s p g 154) l t m d ly d/ p ll n p c in 300 000 un ts I M c twi d ly may b f lu

B G l M s s

1 R t B d st s m st mp t t in h rt g the u y f th d

2 Co t l f ough

St m inh l tions Th h ki g ph of the dry st g h lp d b t by t m i h l t on in a wa m o m C m pound b n o n tin tu l t p to ach qt (1 t) f wat m y be dd d

b Cod n mall d se 15 30 mg (1/4 1/2 g) q 4 ho m y b g t h lp nt l th p r ysm of ough g Eph dr ough m xture w ll b h lpful f b o h p m i pr s t (man f t d by wh e i g)

℞ Eph d in lfat

hyd ochlor d 1% S l 30 0 l

Cod pho phat 0 5 g vi

Sy py v h l q ad 120 0 l

S g 4 (1 tsp) q 3 4 hou p n gh

3 Sleeplessness Pentobarbital Sodium U S P Pentobarbitone Sodium B P 0 1 Gm (1½ gr) at bedtime should be given

CHRONIC TRACHEOBRONCHITIS
(Chronic Bronchitis code No 350 100 0)

A chronic nonspecific inflammation of the trach obronchial tree manifested by cough which is usually the only constant symptom The cough may be productive or non productive *Do not diagnose chronic bronchitis on the basis of chronic cough alone Any patient with a chronic cough should be given a thorough examination including a chest x-ray* As a rule a diag nosis of chronic bronchitis can be made only by exclusion Primary chronic bronchitis is a rare disease almost all cases of chronic bronchitis are secondary to other respiratory conditions or inflam mations Intractable cases *may have an allergic basis* *Physical* findings may be absent or a few rhonchi and wheezes may be heard

T tment
- A Spe ifi Measures There is no specific treatment for chronic bron hitis *Treat the underlying condition*
- B *Ge e al Measures*
  1 Remove or eliminate exciting causes such as smoking ex cessive cold air damp atmosphere ind strial fumes etc
  2 Drugs
     a Ephedrine and similar drugs may give relief in many cases when bronchospasm is present
     b Saturated solution of potassium iodide 5 10 drops t i d as tolerated may be helpful
  3 Adequate rest in a dust free room
  4 Optimum nutrition and hygiene

BRONCHIAL ASTHMA (code No 350 390)

Bronchial asthma is a symptom complex due to a variety of causes It is characterized by dyspnea, especially of the expiratory phase with wheezing a d whistling which are due to edema of the bronchial lining and/o contraction of the smooth muscl s leading to constriction of the bronchi

D agnosis
- A History of repeat d attacks of expiratory dyspnea frequently in an emotionally labile patient with a definite allergic te dency The attacks are precipitated by exposure to the all rgen or at times by severe emotional stress
- B Physical Examination
  1 During typ al attack Examin tion is chara teristic
     a Severe expiratory dyspnea and at times cyanosis
     b Chest held in partial inspiratory pos tion
     c Inspi ation short and expir tion greatly prolonged
     d Cough difficult and may b come violent
     e Sputum thick and tenacious
     f Chest hyperresonant to p rcussion

g Ch at I ll of musical rales which frequ ntly may be h ard at a di tan e

2 B tween atta ks May b e t r ly neg ti or may show a v ry full emphysematous hest with reduc d vital capacity

C Diff ti l D g osi Many dis ases m y simulate bron hi l thm Of th se th most important are ard ac a thma d g ne alized emphysema specially whe chronic bronchitis is sup rimpo ed Th ppearance of br h al asthma in mid dl o ld ge should make on sp ct bronchial opl sm

T tm t

A Th t atm nt may be di id d int two ph s

1 T atm t of the a t l attack

2 Int im th apy whi h is imed at pre enting furthe attacks

B Drugs used for the specific treatment of asthm In th o t l f th a ut att k t in th p ti g ts hav come to be looked pon as specif c for relief while other prep rations r of v l in ab ting tt k It is n y to k ow th p epa ati s a ailable their mod s of dminist tion and th indic t ons f r e h Th ch t page 118 ummarizes the imp t t drug

Epin phrin (d n line) is the drug of cho c for the m g cy management of acut b onchi l asthma Howe er it h s be show th t ti ot opin (ACTH) or ortis e an be s d t top an attack wh n ll th r measure fail Th ons t f action of ACTH a d co tiso is mu h low than th t of epi n ph ine but they sh ld be employed co urr tly with pi ph ine in s ve ttacks of asthm *Epinephrine must be u ed c uti usly in patients with ardiac asthma hypertension or angina*

T tm nt f the A t Att k *Do not use morphine*

A M ld Mod t Att k Epin phrine (dr nalin) i the d ug of h e

1 Epin ph in inject o (injection of dr alin) 0 2 0 5 cc (3 8 ♏) of 1 1000 ubcut

2 Epinephrin inhalat on (1 100 in aq e s s l ti n) by n b li very 30 60 minutes p n

3 Moderat tt k R pe t epinephr n (dr aline) ub t ev y 1 2 ho rs

4 Epin phr in oil 0 2 1 0 (3 15 ♏) 1 500 I M m y al o be g en at ons t if a prol g d effect is d i d May p at in 10 14 h s

5 Ami ophylline (theophyllin ethylen d min) 0 24 0 48 Gm (3 3/4 7½ g) in 10 20 cc (2½ 5 dr) s l l wly I V if tt k is not c nt olled 0 48 Gm (7½ g) m y b dded to 500 1000 cc of aline a d gi en by I V d ip M y al o giv thus a re t l instillat or e t l ppos to y in the same d

6 Ephedri s lf te o hyd ochl d 25 50 mg (3/8 3/4 g) w th w th t a ba b tu at m y eli v m ld tt ks (s p ge 120)

7 R as e patient th t att k can b ont oll d

8 S dati n Phen barbit l (Ph oba b tone) 0 1 Gm (1½ gr) imm diat ly m y r p t 0 03 Gm (½ g) q i d

DRUGS USED IN THE TREATMENT OF BRONCHIAL ASTHMA

Preparation	Dose	Mode of Administra ti and Indi tion
Epinephrine Injection U S P *Injection of Adrenaline B P* (1 1000 dilution of the hydrochloride in aqueous solution)	0 2 1 0 cc (3 15 ♏) may repeat up to q 30 minutes if necessary 1 cc (15 ♏) in liter of 5% glucose solution Gi e at 60 80 drops per minute	Subcut This is the most commonly used preparation I V *Caution* Reserved for very severe acute attacks when more conserva ti m su es f il
Epinephrine in Oil Injection U S P *(1 500 dilution)*	0 2 1 0 cc (3 15 ♏) May repeat in 10 14 hours *Duration of* action is 3 24 hours	Subcut or I M usually given with aqueous epinephrine to patients with se ere or re urr nt asthma
Epinephrine Inhalation U S P (1 100 dilution in aqueous solution) Isopropylarterenol *(Isuprel® (1 100 dilution in aqueous solution) For inhalation or I]*	0 5 cc in nebulizer Individualize dose 4 8 inhalations usually suffice (Isopropylarterenol causes less vasoconstrictor action)	Glass nebulizer operated by hand bulb or pressure from an oxygen tank or nebulizer with intermittent posi *tive pressure breathing* (IPPB) (see page 149) Most useful in aborting atta ks
Isopropyl rterenol tablets (5 10 15 mg)	Sublingual individualize dose	May be useful in ab rting attacks
Corti ot op n *(ACTH)*	10 40 mg I V in 24 *hours or 25 mg of* regular or gel I M every 6 hours initially	Decre se to tolerance *in prolong* d use Used f r severe attacks and stat s a thmati us
Corti one	25 75 mg q 6 hours	*Orally*
Aminophyll ne Injection U S P B P (Theophylline Ethylenediamine)	0 24 0 48 Gm (3 3/4 to 7½ gr) in 10 or 20 cc saline May repeat in 3 4 hours Duration f action 1 3 hours	I V slowly May be used with or without epinephrine Val u ble in s v re atta ks when patient is pi neph ine fast
Aminophyllin U S P rectal suppository	*I supposito y every 1* hours	*Usef l o ly* when prolonged effect is de ir d
Ephedri e Hydrochloride U S P B P or Ephedrine Sulfat U S P (capsule or pill)	25 50 mg (3/8 3/4 gr) very 3 6 ho s May combine with phenobarbital 15 30 mg (¼ to ½ gr) or pentobarbital sodi m 30 mg (½ gr)	*Orally Of l ttle or no* use in ac te ttack May be of some v lue in aborting an attack or decreasi g the n mb r of ttacks
Ant h stam n drugs (see page *66*) *(pill or* cap ule)	50 100 mg b i d to q i d	Orally Of l ttle use in acute att cks May be of val in bort ng tt ck r decrea ing *number of attacks*

B S Atta k Epinephrine re ponsive p t e ts (may also fol low as f r status sthm ti b low)

1 Epin phri e inje t on inj ct on of adrenaline 0 5 1 0 cc (8 15 ꝟ) 1 1000 ol tion subcut and rep t ev ry 30 60 mi ut s if nec ssary
2 Epinephrine inh l tion 1 100 by n buliz r usi g o yg n for sp y m y gi d am t elief May p t ev y 30 60 min tes
3 Epin ph ine in oil 1 500 0 2 1 0 cc (3 15 ꝟ) I M f pro long d ff t M y help prevent re rr nce of attack a d an be repeat d in 10 14 ho rs
4 Amin phylline (theophylli thyl edi mi e) 0 24 0 48 Gm 3 3/4 7½ gr) in 10 20 cc (2½ 5 d) li e lowly I V if atta k not o t oll d M y also gi e th s a ct l instilla tion or t l uppository in the ame d se
5 S d tion must b dequ te Us e of the f llow g
   a P ntob bit l sod um (p toh rbit odi m) 0 1 Gm (1½ g) at on e and m y ep t
   b P ald hyde 4 8 (1 2 d) lly in f uit juice o r t lly in 30 c (1) 1
6 100% oxygen (or 20% helium w th 80% oxyg n) inhalat by m sk t 6 12 l t s/min te may gi great l ef from dy p ea
7 Wh n ilabl the u of oxyg n by i t mitte t p itiv p ur (g B nnett v l e) and b onchod l ting a osols dmin t d multa usly th ough the ame appa atus af fo d the m t d am t c r lief cute tt ks of sthm As a bron h d l tor isoproprl rterenol (Isup el®) is to be preferred b cause it prod ces a l sser deg ee of syst mic r ti than do s epinephrine
8 Th pl of rfa e tens low ing ag nts (g Alevair ®) dep lyme ing ym (g hyal on d) o digesti e yme (e g tryp i) by ero l in thi o dition is t ll t d t rmin d Th d is bil ty f using the l tter h e c tly be n qu tion d in v ew of its ffects on th m rph logy f the ll f th sp t ry lining s w ll as t i it t g l cal ff t

C St t s Asthm t d S e Att ck t Ep ph in sta t P t t

1 C ti ot pin (ACTH) 25 50 mg of r gul r o g l pr p a atio b t or I M o ort 25 75 mg orally immed t ly a d r p t y 6 h u s If th p t ti ho p t li d dmini t ti ot p (ACTH) 20 40 mg in I V d p er 8 12 hou pe d e y 24 hours ACTH m y h mo p d t of t on but otherwis both e ab t qually ffecti e Rel f hould b e id nt in 6 12 h ur and lmost mpl t fr d m f m th ll g man f t t ons 24 48 hou s Th m d c t on ho ld p b bly b t d f r 7 10 days in g d ally d min hi g d s aft th f t 4 5 d ys
2 Patie t h uld b ho p t l d f po bl in n lle ge f r m
3 100% o yge r 20% h l um w th 80% oxyg should b g v n by m sk f l f f dy p
4 Am ophyllin (th phylline thyl d ami) 0 24 0 48 Gm

(3 3/4 7½ gr) in 10 20 cc (2½ 5 dr) saline slowly I V and by rectal suppository for immediate relief of symptoms 0 48 Gm (7½ gr) may be added to 500 1000 cc of saline and given by I V drip

5 Sedation must be adequate until relief is obtained Use one of the following
   a Pentobarbital sodium (pentobarbitone sodium) 0 1 0 2 Gm (1½ 3 gr)
   b Paraldehyde 8 15 cc (2 4 dr) in 30 cc (1 oz) oil by rectum
6 Surface tension lowering agents (Alevaire®) by aerosol may be helpful in some cases (see page 154)
7 If corticotropin (ACTH) or cortisone are not available
   a As soon as epinephrine responsi eness returns use epi *nephrine as above Epinephrine may be administered* cautiously 1 cc 1 1000 solution in 1 liter of 5% glucose by intrav nous drip (60 80 drops per minute)
   b General anesthetic agents may be life saving
      (1) *Rectal instillation of 30 90 cc (1 3 oz) of ether in* equal quantities of olive oil repeat in 12 to 24 hours if necessary Usually patient awakens free of attack
      (2) If a trained anesthetist is available inhalation ether anesthesia may be employed
8 Bronchoscopy under general anesthesia is sometimes indi cated to remove tenacious secretions

D General M asures
   1 Eliminate any known allergens from patient s environment
   2 Maintain adequate rest and relieve apprehension by reassur ance and sedation
   3 Respiratory infections must be treated vigorously with anti biotics as indicated I M or by a rosol
   4 Fluids orally or parenterally for any dehydr tion

Interim Therapy

A Spe li Th rapy Att mpt to determine which allergens play a role and tre t accordingly

B G ne al Me su
   1 Emotional disturbances should be corrected whenever pos sible
   2 Good living hygiene should be promoted
   3 Patients with apparently i trinsic asthma (usually due to infections of bronchi) may be h lped by a tibiotic therapy (see pages 115 and 121)
   4 Eph drine hyd ochloride or s lfate 25 50 mg (3/8 3/4 gr) with or without ph nobarbital (phenobarbit ne) 15 30 mg (1/4 1/2 gr) every 3 6 hours may preve t or reduc recur rences
   5 *Aminophylline ephedrine* phenobarbital capsules

℞		
Aminophylli e	0 2	gr iii
Ephedrine hydrochloride or sulfate	0 0 5	gr 3/8
Phenobarbital	0 015	gr 1/4

   Sig 1 capsule every 4 hours

   6 The new antihist minic ag nts may give rel ef in som *patients but their use in bron* hial asthma has gene ally been quite disappointing (see page 66)

7 P ti nts who a e not helped by other m sures m y be t eat d ch oni ally w th small dos of corti otr p n (ACTH) or ortison The dosag employ d is just suff cie t to ke p th m comf rtable and relativ ly f e f sympt ms

BRONCHIECTASIS (code No 350 100 6)

B nchiecta is is a hronic prog es i e di as of the b on h and b on hiol s char cte ized by d latation of th b on hi or b onchioles th pr sence of varying amount of inf lt tive infe tion and fin lly d tructi n of the ol ed parts and of the su ounding tissu The etiology in many as s u known b t c n g nital fa tors and chronic or e u rent pulm n ry infecti ns un doubt dly pl y a role

Diagn is

A H t y

1 Ch oni ough usu lly produ tive of m ch p ul nt sput m and m marked up n a ing in th morning

2 R cu r nt attack of pulmona y infe t ns w th aggravated c ugh f er sw ts and hill

B Physical Examin ti n Ch st finding x ept in se e o during c te pneumonitis e r r ly s gnificant R les at lung bases a d som whi p ed pe t ril quy r the mo t om mon findings

C Lab t ry Findings

1 X r y Routine ch st x ay ar us lly insuffi t to mak diagno is If chest x r y s neg tive and bronch ecta sis is uspe ted further studi s re n c s ry

a B onch scopi xamination

b B onchograms (x ays of chest following inst llat on f iodiz d il into b n hi eith th ough b on hos ope d ectly into th t a he) e mo t important fo di gno sis

2 Sput m Th e must be made by an expe ien ed r diol g t The sputum is usually f und to par t into 3 lay s Bact ri l gi l tud s alway ev al mi ed inf tions u u lly with st ept oc and t phylococci pr d mi nating

T tm t

A Sp ific M a u s Treatm nt with antibi ti g t h s been f b n f t in tempor rily m ll ting ymptom pecially during the cute x c b tion b t h s had no l ting effe t Th am unt of sputum nd ugh i r du d and the p t nt f els b tter but th s ben f t w r off n a f w we ks to mo ths The t atment sh uld be r peat d s n ce ary nd m y be of g at ben f t in m ld r c e o m d b lit t d pa t nt wh e s g ry co id red too adi l a p oced When po sible pr dominating rgan sm ho ld b d ntif d and their s ns tivity to the v riou nt bioti s d t min d

1 P nicillin aerosol (s p g 154 f t chn) 50 000 100 000 units of ystallin pe icillin G in 1 0 2 0 cc alin s lu ti n q i d

2 P r nte l use of p ni illin ex ept d ing att ks f ut

pneumonitis appears to be of l ss value than direct inhala tions

3. Streptomycin aerosol (see page 154) may also *l e of be efit* in some pati nts especially those in whom p nicillin resist an e occurs Ea h cc sho ld contain 50 250 mg of str pto mycin depending on concentrat ons desired Administer in the sam manner a for penicillin (see above)
4. Combined pe i illin stre; tomycin aerosols may b of b ne fit in many cas s Use th same oncentrations for the drugs as used ind vidually
5. Oxytetra y line (Terramycin®) is also availabl for a rosol administration (50 mg /cc in propylene glycol) a d may be used as above (See page 154)
6. E zymes by aerosol may be of value in obtaining better drainage of thick inspissated material (see page 154)

B C al M a i

1. I ostural drainage Postural drainage has proved to be the mo t ffective single m asu fo th symptomatic relief of patients with bron hiectasis The patient should ass me the positi n that gives him the maximum drain ge and this varies with the location of th lesi n Expe ience will help the patient det rmine the best position to use Since most lesions are at the lung b ses th most common method is to have pati nt kneel on a chair place hands on the floor and keep th hips elevated m int ining this positi n f 10 15 minutes Two to four times day s usually sufficient the first drain ge b ing just upo aw kening and the last just b fore bedtime
2. Avoidan e of upp r r spiratory inf ctions is very important in controlling th bronchial infect on
3. Correction of associated dis ase Many p tients w th bron chiectasis suffer from chronic uppe respiratory infections with postnasal drip Th s m st be corrected whe e er pos sible
4. Climate Although climate does not ure a warm dry li mate often is of benefit espe ially since it tends to red ce the incidence of upper respi atory ir fections Avo d a d sty smok filled atmospher
5. Rest Patients with severe diseas should always ha ad quate rest in bed for symptoms are often am lio ated by this m asure The foot of the bed should be rais d 6 to 12 i ches
6. Good nutrition and health are very important Adequat food and rest will aid in slowing th progress of the d seas Smoking sho ld be prohibited
7. Bronchoscopic drain ge is of value initially in all cas s to eliminate bronchial stenosis or ob truction as co tributi g factors It may be necessary to dilate the sten sed bro chus but repe ted b o choscopy *is not advised*

C Su gical T eatment Pr se tly accepted ind cations incl d

1. Younger pat nt in good condition who are having chronic or r urr ng symptoms of any degre Modern surge y w ll permit resecti n of fai ly extensi e bil teral d s ase
2. Patients up to 50 years of ag who are having severe symptoms

(espe lly r cu e t h mo rh g) f m p ed minantly u
l te al d sea and who are oth wis good surg l r ks

DISEASES OF THE LUNGS

PNEUMONIAS

P umo l c ts f nfl mm t y hang s f the pa hym
f the lu g lm st fw y s t d with o d to inf t f
th p st it w cu t m y t la ly th pn umonia int atom l
types (l l b d b n hi l) b t th s la f t n i ill
ful pu po at pr nt In i w f th v r g ow g n mb of
t m b al g nts e sh uld l ify th pn umo o th
b s f t l gy n l t at w th th app p i g t

Th pn umo e gt ll th mo t omm s of pn mon
In g l t may b st i d th t th man g m t f ll th p n
moni foll w th m p c pl tho g n ng th m n g
m nt of p m l pn m n

PNEUMOCOCCAL PNEUMONIA (code No 360 101)

D gno s

A H st y Us lly s dd s t w th h ll and f Oft n
pl f p n i p ent with ugh

B Phy sl F d gs V y with t t loc t n nd d t n f
th path l g l p oc f m n n f w fine r l t m
st e nsolid t on f ne o mo l b

C L b t y

1 Sp tum Pn l t ually t g d w th bl od (l ght p k t
the ol f p u e j)

2 All p t t w th p mo (p lly f) h ld h
th f ll w g l b at y x m t dd t n t ut
u and bl od t di s h t ay p t m unt (p m
c t p r l mm n f id) d bl od lt

T atm t

B for b gin ing th py t d s bl t bt p t m and
blood f lt d t d t m n the t b t l an d
Th s imp t f th inf t on r

Th rapy vari with the s verity f the di a de
termine the s ve ity rding t th crit r a h wn in
the cha t n a e l b a d reat s utl n d b low

Sp f M

P n ll th d g f h m p m oc l inf t
Chlo t t y lin xyt t y l n t t y ll hlor mph
and eryth omy n ar lso highly ff t m m t p moc c
inf tions b t a prob bly l ghtly inf o t p n llin n
inf ct ons Th s lf n m d d gs a lso ff t but th
p n e to p i llin u lly m p d nd ompl ti n
l s f qu t

Therapy Based Upon Evaluation of Factors Influencing Prognosis

Factor	Mild or Moderat	Sever	Very Sev re
Ag	U der 40	Ov r 40	
Organism count in sputum/oil field	Under 30	30 75	Over 75
Lob s inv l d	S ngle	2 o 3	4 o 5
l ulse r te	U d r 120	O r 120	Over 140
Blood pressure			
Systolic	Over 90	Und r 90	Shock or
Diastolic	O r 60	Under 60	pulmonary d ma
Leukocyte ount	Ov r 10 000	000 10 000	Und r 6 000
Albumin ri	0 to ++	to +	
Associated d se s	0 to mild	Moder t	S ve e
Complications	None or steril eff sion	Emi yema lung bs ess etc	M n g tis end carditis
Blood cultu	Neg ti	Pos t	
Pneumo occl type	Higher types	I II III IV VII	
M t lity rates			
Range	0 1 0%	2 5 10%	10 50%
Av r g	0 4	4%	20%
Ther py ind cat d	Usu l dos s f penicillin bro d spe trum ant biot s or sulfon mid s	H gh do s of p ni ill n b oad p ctrum nt b otics or sulfonamid s	Mas e doses of p nicilli

(M d fied f om M rr s F Collen I erman te Foundation M dical Bulletin VI 31 Janu ry 1948)

may be administered in sever l ways The soft r bber facial mask of the BLB OEM or B n ett type is probably b st With these masks oxygen conc ntrations up to 95% m y be e s ily furnish d Oxyg n tents ar g nerally u ed for patients in toxic delirium who would othe wise remove the mask How ever the t nt is generally not ad i d be ause th ave age con e tration of oxygen is only about 40 50% an l unl ss watched carefully carbon dioxide may a cum lat

B Fl id Fl id irtake must b d q t wh ther g ven orally or p rent rally to maintain a urine outp t *f at least 1500 cc* Patients taki g sulfo ami! s sh uld h ve suffi ient alkal niz ng powders so that the u ne is b e pH 7 at all tim s *Potas* sium bicarbonate should be used in p ti nts with actual or poten tial heart failure care being ex rc sed to void potass um to city

C Diet During the severe a ut phas pat ents us ally ha little desire for food *Dur ng this short a te phase food intake is of* little importan e Patients who d vel p compl c ti ns nd hav long c nval s ences should be pla ed on high protein high vitamin high calori d ets

Symptomatic and Supporti e Measures

A T xi D l i m Th ten nt nd acti ity f th tox c d *lirium which may* occur in se re pneumon a must be c ntrolled

to av th p tient fr m xhaustion or circula ory f il re

1 Pa ald hyd is th d g of cho ce f t s purpos
   a O 1 8 c (d) at once i. the s no espons in 30 m utes epeat dose u til patient is q t Th n gi e 4 15 c (1 4 d) ry 3 4 hou s p r n. restles ness
   b L i muscular I pa rt unab to swallow g 4 (1 d) t on e if th 1 no r ponse in 30 minute re pe t dose until p ti nt is quiet th n gi e 4 8 cc (1 2 d) I M e ery 3 4 hours p r tle s s
2 B bitu te M ld r t s e and sl pl s ness n be tre ted w th th f l owing drug
   a P nt ba b tal odium (ne tobarb one od um) 0 1 Gm (1½ gr) t b dtim
   b Ph nob bit l (ph noba b one) 15 30 mg (¼ 1 g) t i d during th d y

B Shock and P lmonary Ed ma Th usual a s of death in p u m nock (c to y collapse) nd/ p lmon y ed m Th most impo tant f t r in m n g m nt f th nd tions is ve y ly ecognition and p mpt igo ou tr t ment Th py i es t lly th me in both onditions

1 T eatm t f ... e pag 31
2 T tment f an x.a Be aus f th mp t nt ol f a in th prod ction f shock nd pulmona y d m i pn um p mpt initiat on f xyg th r py p f bly w th i it p es u e f

C Cough Ge e ally qu s littl th py nd l w th d qu t t tm nt Exp to nt f utmost mpo tan gh is e e Cod in m y give l f nd h ip p le p

1 Cod ph sphat 0 03 0 06 Gm (½ 1 g) lly utan ously ev ry 3 4 h s
2 ℞ Ephed in sulf te r hyd ochl d (1% Sol) 30 0
   Codei phosphat 0 5 g
   Syrup f w ld h y o
   oth v h cl q d 140 0
   Sig 4 (1 t p) q 3 4 h

D Pl u iti p
1 M ld p n Ethyl hl d p y f utar gh Sp ay p t t f bo t 1 min t o f g nd rt cally v t f p f t about 1 in h w d is f m d Th m th i g f om p in f 1 t 10 h
2 S p in P oc in hyd hl d S 1) (in) ted b t the a f gre t t p in 1 5
3 V y e e p M p 1 Hy! hl d l w Peth din Hyd ochlo d B P (I n 1) 50 100 mg Pr e t b d g f ho f t o th p t y 1

Abd m I D t t o Abd m n i d w llow g oc t d w th dy f q t at t w th p mon

O yg n th py in h gh on t (90 100%) m t s f l b h xyg y p dly b

from the intestines
2 Neostigmine Methylsulfate U S P (1 2000 Sol) 1 cc (15 ♏) subcut and insertion of a rectal tube will generally produce rapid initial decompression
3 Stomach tube for dilatation of the stomach Suction through a nasal tube passed into the stomach is necessary

F Cardiac Abnormalities
1 Congestive failure In elderly patients or patients with pre existing heart disease congestive failure may be precipitated by the pneumonia When this occurs digitalization by one of the rapid methods is indicated *(see page 197)* *This must be* distinguished from shock and pulmonary edema (see page 127)
2 Cardiac arrhythmias The occurrence of extrasystoles is common and generally requires no treatment If auricular fibrillation or flutter develops rapid failure may be precip itated Digitalization by one of the rapid methods is gener ally indicated in these cases (see page 197)

Complications
For treatment of these complications see the respective dis eases (Modified after Collen)

Complication	% Incidence
Sterile pleural ffusion	4 5
Empyema	0 3
Lung abscess	0 3
Pericarditis	0 3
Endocarditis	0 1
Meningitis	0 1

All pleural effusions associated with pneumoni s must be as pirated promptly to detect early empyemas which may be treated medically (see page 142)

STREPTOCOCCIC PNEUMONIA
(Lobar code No 360 10?) (Bronchopneumonia. code *No 361 102*)

An uncommon type of pneumonia usually s condary to a pre ceding pulmonary inf ction (i e virus pneumonia influ nza or measles) Onset is most often grad al but is at tim s sudden with severe intoxication m rked dyspnea and cough with bloody or mucopurulent sputum Pleural effusion o curs early is fai ly common and may progress to empyema Most cases are du to β hemolytic streptococci

Physical findings vary with severity there may be only scat tered dullness and moist r les In severe cases pleural ffus on obscures pulmon ry signs Throat is usually reddened and has some exudate

Treatment
Penicillin is the drug of choic Dosage is similar to that f r pneumococcal pneumonia

STAPHYLOCOCCAL PNEUMONIA (code No 361 105)

An uncommon typ of pn umonia usually seconda y to a p e d ing infection Onset is mo t often grad al and progressiv with pati t becoming gravely ill Cough and dyspnea ar common M lt pl lung absc sses occu frequently Patchy consolid tion w th diffuse l s e ommonly f und Sputum is va i bl in appearance

Tr atment

Sin st phylococ i vary greatly in their esp n to peni illin and othe antibi tics sensitivity tests hould be perfo med M an whil ther py should be initi ted with ythromy in 0 5 Gm e ry 6 h urs pending result of th t sts

FRIEDLANDER S PNEUMONIA (code No 361 131)

Pneumoni d to Kl bsiella pn umoniae is often ssoci ted with chro ic debilit ting dis ases The set s u u lly sudden w th chills fev r dyspn a cyanosis co gh and mark d t x city and in most ca s p gr s s rapidly to a fatal te min ti Th r is a tend y t necrosis and abscess form tion in th s b cut or chronic f ms Early e ognition is impe ati e for fa orabl out come

Physical findings ar v riable and extensive in ol m t m y give only dullness and diminished bre th sound Sp tum is r dd h mu oid and t nacious giving a currant jelly appea ance White blood cell count is variabl may ha e leukope i or l uk cyt is

T atm t

A Specifi Meas e Tr at all Friedland r p umoni as ve y eve infection

1 St eptomycin, 1 Gm every 6 hour unt l f vo bl respon occur then 0 5 Gm ev ry 6 hou s unt l af b ile 3 day and

2 Oxyt tr ycin (I M o I V) chl rt t y lin t tra ycline or hloramphen ol 0 5 Gm every 6 hou s or Gantrisin® 1 Gm e y 6 hou Continu fo 2 3 w k

B G n al M See P umococ l Pneumoni p g 125

HEMOPHILUS INFLUENZAE PNEUMONIA (code No 361 110)

A r r form f p eumon a wh h u lly is rapid in o s t and p og si n The t tanding fe t s se in l m nt f th b onchi and b hiol s l di g to b onch t i and h m rhagic d ma of lungs P ti ts t m ly t i Th i a pat hy ol d tion d the sp tum i bloody Leukop i is f qu ntly p s t

T tm t

A Sp f c M as Conti t tm t fo 7 10 d y ft r t mpe t h et rn d t mal

1 Combi d st eptomycin nd s lf am d the py i th m t of hoi e St pt my 0 5 1 Gm eve y 6

has been complete clearing of the lung by x ray Serial x rays are required in this follow up which may take many weeks

NEOPLASMS OF THE LUNGS
BRONCHOGENIC CARCINOMA (code No 350 8)
(Epidermoid: code No 350 814)

Neoplasms of the lungs form a very important group of th malignancies The metastatic tumors are most common b t the primary neoplasms are of gre test int rest in diagnosis and therapy The primary ones usually arise from the bron hi and spr ad into the lung fields They are rarely diagnosed early because of the insid ious ons t and tendency to mimic other pulmonary disease Chronic cough is the common presenting symptom As the proce s spreads the cough becomes productive and hemoptysis consolidation ate lectasis lung abscess and pleural effusion may occ r It must always be considered in th diagnosis of any acut or chronic pul monary disease especially in males ov r 50 years of ag Bronch s copy and examination of sputum for canc r c lls are important diag nostic tools

Treatment

A Surg ry is the treatment of choice when the lesion is discovered early

B Supportive and symptomati measures fo those cases in which surgery cannot be performed

PULMONARY ATELECTASIS
(Compression code No 362-435)
(Postoperative code No 362-415 4)

Atelectasis is d e to obstru tion of a b on hus with absorption of the air and collapse of the lung d st l to the obstruction Most cases follow majo surgery and te d to occur in the right lower lobe The condition usually is manifest 1 4 days after surgery and th f ndings are tho of poor e tilation and collapse of the involved ar a If immediate treatm nt is not carri d out se ondary bacter *ial in asion occ rs and a pneumonitis dev lops*

Tr tm nt

A Postope ative Atel ct si

1. Force pati t to hyp ve tilate either ol ntarily or by use of a mixture of 95% O_2 nd 5% CO admi iste ed by ma k for several minutes *every 1 3 hou Th s s also a g od* prev ntive measure
2. Bronchodilatation by aerosol w th int rm ttent p siti e pres *sure (g* Bennett l e) ha b en d m n trated to resolve many cases of postope ative atelecta s Th pparatus should b used e ry 30 m nutes out of e ry hour wh le pa ti nt i awake *f r 24 hou s befo e de id ng whether furth r tre tment is of v lu*
3. If rapid resolution does not o cur th mu us pl g should be aspirated through a bronchosc pe

4 Institute antibi t c therapy P ocaine penicillin complex
300 000 unit b i d
B Spo t neo s At le t sis B onchoscopy to determin the nature
f th batr t on and th n institute pprop iate tr atment

PULMONARY EMPHYSEMA
(Due to Unknown Cause code No 362 9x6)
(Postural, code No 362-434)

Pulmo ary mphys m is a disea e usually found in older in d viduals and th e suff ring f om hronic b on hial a thma Ther p ogr si d tenti n of th pulmonary l li w th subs qu nt upt of the inte l l r memb s and r pla em nt of th afv oli by l g poorly fun ti n ng air s cs
The d agnosi is g n rally not difficult The chief compl int is dyspn Th anter po terio diamete of the ch st s gene ally nl g d Th lung field are hyp r son nt and br th sound o s Pulm nary emphys ma must be d ff e ti ted f om dy p n a d to ngestive fail e

T tm t
A Sp f M a u es Sin e many pat nt ha e an as ociat d hr n bron h t s w th s m el ments of pasm th apy f gen lly similar t that tl ned f r hr nic bron hitis or h on b hial sthma (e page 117)
1 Spasm lyti by hal ti n g nt to reli e b chial pa m Epinephrin
2 E ad c te any infe t o P icillin o str pt mycin a os l (s p g 154) (e pag 118)
B G l M u e
1 Inh l t on of 100% oxygen t i d f r 20 30 minut s helps re l dy pne d appe a t r du e spa m R ently th u e f int mittent p siti e p s u e in som b on hial dilat rs ha be n hown t b of onsid able al e Oxygen must be us d with aut on in ca es with l n t nding anoxia since use of 100 xygen h s a d e na a d even death in me patients (s e p ge 145)
2 Ma nt n mech nic l eff i n y f di ph gm at its optimum Abdominal belt Obese pat nt should wear an abd min l belt du dominal m s l t th with poo b ing th d y (g ke Lag n b it)
b M u l ii f of v d tenti n f l ngs The palm of both h nds r pla d und th nt i ibs and push d inw d and upwa d d ing end f expi at n This i p t d 10 15 tim s 2 3 tim s d ily P ti nt oft n l m the dy p a is reli ved f ho s by th ma e
c Th apeut pn m pe sion um can be mployed in l t d p ti nts

2 Inje t 50 000 100 000 units of penicillin in 10 cc saline into the pleural space through the same needle This is fo ither prophylaxis or actual therapy

B Pl ural Fluid Fxami ati n

1 Gross examination Take specific gravity to determine if exudate or transudate
Smear and stain for detection of organisms a d nature of cellular content Collect a specimen in an anticoagulant for *cell count*
3 Cultur on appropriate media and inoculate gu nea pig with all fluids from unexplained pleural effusions to rule out presence of tubercle bacilli or fungi
4 Pathological examination of centrifuged button in sus pected cases of malignancy

Tr atm nt of Post p umo ic and Oth r St ril Eff io s

A Specific Measures All prophylactic measures are d r cted at the primary disease Begin or continue antibiotics i dosage as for treatm nt of pneumonia (see page 123) until patie t has been afebrile for 10 14 days or fluid is almo t entirely resorbed

B C n r l Me r s

1 Tho acentesis Whenever a che t tap is performed instill 50 000 100 000 units of peni illin in steril s line
   a Remove eadily obtainable fluid by multipl thoracentesis at daily i terv ls if n cessary Removal of more than 1000 c at a time is not advisable
   b Re e amin pleural fluid to rul out empy ma if the pleurisy does not respond to tr atment
2 Bed rest until pati nt is afebrile

Treatment of Tuberculou Effusion (cod No 370 123 8)

A Sp ifi Me su s Treatment for uncomplicated prim ry ef *fu ons is e se ti lly the same as th t for* minimal pulmonary tuberculosis A course of streptomy in and PAS is recom mended (see p ge 135)

B G neral M a res As for pulmonary tub rculosis (se page 131)

1 Bed rest most important
2 Thoracentesis Removal of all readily obt nabl fluid (see above) is advisable to minimize l ter thickened pleura
3 Pneumoperitoneum is used by some for the underlyi g lesic It is initiated aft r feve h s subsided and acti e fl id for mation h s stopped
4 When high fe er persists lo ger than two weeks hema togenous dissemination should be suspected

C Follow up Treatm nt Careful follow up for a 5 y ar *period i* ne s ary be su many patients with primary tuberculous effusions develop pulmon ry tub *rculosis later* *sually* within 5 years

EMPYEMA (code No 370 100)

Empyema is usu lly secondary t pulmon ry infection but may result from direct contamination of the pleural space through traum

o thorace t sis The pat ert is usually quite ill and the o s f bril and s vere

Tr tm t

A Sp cif c M asures System administration in high dosag f pp pr t h m therapeut c or antibiotic g nt as determin d by xam at n f infecting organism T eatme t sho ld b o tinu d for 10 to 14 day after p tient is afebr le o Ha d has become st ile (s page 514)

B Da ly ho t nte a hould be performed r mo ing as mu h of th p r i nt ma r i a p) sible Fr q nt physic l xamina t n of the chest with x r y m st be done to a o d o rlooking any loculat d ar as (po k t) of purul nt mat al

1 I rig te mpy ma ty with 500 2000 cc a lin

2 I st ll 00 000 200 000 units of p ni llin nd 0 5 1 0 Gm of t ptomy in in 0 saline i to the c ity t th compl tion of the ir g t on Continu da ly u til fluid in ca ty has b n st ril for 10 14 d ys o u til fl d n no longer b obtai ed

3 V rious enzymati ag nt ha e recent y b e p epared wh ch d g st th prot in materi l esp lly th fibrin t t forms in this ndit or Th s are l introdu ed dire t y i to the thor c ity Th p in p l on s a ail bl re trypsin (Trypt r®) and str pto in s st eptodo n s (V ridase®) Tryp in ts by d g sting ll non li ing p otei mater al The st ept k nase t eptodor a ttacks m inly fibr n

C S g l dr inage must be i st t t d f p tl t does no mprov w th a f w d ys

HYDROTHORAX (code No 370 522)

Hyd oth is most gene ally du to cong ti cardia f ilu e T tm nt s d ted t the fail e t If In ases f espi atory mba r ssm t r mo al of the fluid i necess y

HEMOTHORAX (code No 370 532)

H motho ax s m st gen r lly d to tr um W rld Wa II xp r en es ha e sh w th t sp ration of th bl od fr m the pleu al avity is the treatm t of ho c Rep ated a pi ations ar pe f med a es y G at are m st be tak n in the e asp a t ons to o d pos bl b ter l ntami at on of the pleural a ty ont nts The p t olyti n ym ha e al o b en us ful i th s ond tion (b e)

PNEUMOTHORAX

A in the pl u al sp occ r as a r s lt of air ent ri g th o gh an op ning th chest wall (I by artifi ial pneum thorax r tr uma) or s a r sult of air nt ing from le in the lungs

HYPOXIA. COMMON CAUSES AND METHODS OF CORRECTION

Phy i logi al Cla sifi ation	Clinic l Co d tion	T atm t
Hypo ia With Norm l Lu g		
D f t tmo pheri yg n	High ltitud flying	Oxyg n at tmosph ri pr sa
	G " ffoc tion" (not poisoning)	R us t tion t tmos ph i p
Ai w y ob t uct on	Fo g bod At l t si due t m cu pl g P ly is r w kne s of la ynge l pharyn g al tongu m l D ow i g	Cl he a w y Oxyge ot lly n d d R it tion
Pa ly w kn f pl t ry m l s	An sth sia I liomyelitis	R us t tion
Pa ly of p l y m r	El t i hock	R t t on
Hypo i With Ab ormal L g		
D mi h d mbe f f tioni g lveoli	P moni	Oxyg t tmosph i p r
	Emphy m t l tasis	O yg by int i t po it pr s r r t tmosph i p
Imp op mi ing o p net tion f in pi d ga	Emphy m b on hi l sthma	O yg by int m t t positi p s
Impa red diffus on o l l m mb ane	P lmona y dema	Oxyg by inte m t positive pre (m n p sur lways p ti)
V ous Art i l Sh t	C g it l h art di s	Oxyg n at tm sph ri p
Hypo i D e t Inad qu t Oxyg n T an p t by Blood		
D mini hed ti " h m globi	A mi	C t nemi
	CO poi g	O yg n t tmosph r p e e itall
Imp d l tion	Cong t f il	O yg n t tmosph p ss r if p lm na y ed m i p t positive p
	Sh k	Oxyg n t a mospre p u e or positive and n g ti p s ur D ot use only positi e p s in h k
Hyp i Due to Impai d Ti s Oxyg tion	Ed ma C ll l kym p i oning (yanide fl o id)	Oxyge t tmo phe i p ure

ported in idence f oxyge t city h v been c s of t t on re ulting from imp perly hum d fi d yg n

TECHNIC OF ADMINISTRATION

Oxyg (ir) may b dministe d t atm spheri p ssure o by ious pre d v ces

OXYGEN AT ATMOSPHERIC PRESSURE

Oxyge i m st ommonly administe ed t atmosph c p e
It s nd cated wh n hypoxia an b cont ll d dequ t ly by th s mean al For ind t ons see pag 146
Va ous method f dm n te ing xyg at tm sph ri p s r ın g n ral u B l w e t b l t d those m thods whi h r mo mm ly us d w th dult d the o yg n onc t t o s wh h c b a hi ed

Method	U l O yg n C c nt tions	U l R t of Oxyg Fl w (L /min)
T nt	40 50%	Fl h t 15 0 M i t t 12 15
C th t		
Na ph yng l (m t i bb)	20 40%	6 8
b O oph yng l	30 40%	6 8
M k		
BLB o q v l nt	80 100%	8 10
b Exp d bl pl st c m k	40 60%	10 1
OEM o B nn tt f m k	80 100%	6 8

O yg T t

A Adv t g

1 G v mod at t ti f yg at m imum com f rt to the pat t

2 Can b us d w th etl ss and un oope ati e p ti t

B D dv t g s

1 M t e p t b y and t p rat

2 C nnot hi e h gh t ti f o yg

3 If ot p t d p op ly yg n nt t o an s ly f ll and b n di id i lik ly to mulat

N l C th t

Th n l thet apparat f o yg n administ ati o i t f a ubb th al cathet r (Fr ch No 10 o No 12) w th the t min l i h p fo at d by 4 6 sm ll hol s a d ction valv m han sm and a hum dif botti

A T hn

1 Th th te should b l an d l b t d w th petrolatum and pla d ev ry 6 12 hou s

2 It may be placed in the nasopharynx or 1 2 inches into nares but concentrations are only up to 20% by this method
3 Place in oropharynx for concentrations up to 40% To cal culate the approximate distance the tube must be inserted *measure the distance from the external nares to the tip of* one ear lobe using the tube to measure with Then pass the tube through the nose into the oropharynx When the patient begins to swallow withdraw the tube about ½ *inch and* secure it in position

B Advantages
1 Cheapest method of administering o ygen
2 Patient is less uncomfortable than with mask

C Disadvantages
1 V ry h gh concentrations of oxygen are not obtainable
2 *Drying of mucosa may result with ordinary humidification*

Ma ks

A Apparatuses
1 BLB masks Nasal or oronasal rubber mask with rebreath ing bag The disadvantage of this mask is that with low flow of oxygen (under 6 8 liters per minute) CO_2 tends to accum ulate There may also be resistance to inspiration from flat rebreathing bag
2 Expendable plastic masks Require high oxygen flow Low *oxygen concentration achie d*
3 OEM and Bennett face masks Similar to BLB mask but do not permit rebreathing into bag utilizes flutter type valve so rebreathing of CO_2 is not possible

B Advantages of Masks
1 Highest conc ntrations of oxygen obtainable without the use of pressure (except for plastic mask)
2 Both OEM and Bennett masks have injector settings so that oxygen concentration can be varied from 50 to 100%

C Dis dvantages Tight fitting masks cannot be tolerated by som *patients*

OXYGEN UNDER PRESSURE

Various pressure breathing devices hav been d veloped which allow oxygen to be administered und r slight positi e pressu e dur ing the inspiratory phase *Although originally these devices were* employed for resuscitation (usually with a neg ti e pr ssure phase in expiration) the value of intermittent positi e press re *in the* treatment of various acute and chronic pulmonary and cardiac on ditions was soon recogniz d

Physiological Eff cts

The princ p l physiological *effects of oxygen administ red* by pressure methods are as follows

1 H lps overcom resistance to gas *flow and wid ns the* bronchioles permitting more effici nt cough and bro chial drainage
2 Increases intrapulmonary mixing creating more unif rm alveolar aeration

3 D cr ases res dual volume
4 Inhibit fluid extravasation into the alv li (hen e of aid in pulmonary ed ma)
5 Interfe es with v n us return to the right heart with con e quent decrease in cardi c output and blood supply to the lungs This latt r phenomenon i of value in managem nt of conges ti e failure specially with associated pulmonary ed ma in shock on the ther hand it is a disad antage and oft n contra indicates the use of po itive pressure device in this cond tion

PRINCIPAL METHODS OF POSITIVE PRESSURE BREATHING

M thod	Pres ures During R spiration	Indi ations and Us	Remarks
M uth to mouth or m uth to e dotracheal tube	Pos i p e sure in in spiration	R us tati n e p ially us ful with children and newborn in fants	M st pr miti e method of positive pressu e but m y be very ffec tive Oxyg n admin istr tion at lower than tmosph ric conc n tr ti ns
Benn tt po itive pressure th rapy unit (moto or oxyg n p wered)	P s t e pr s u e in inspi ration May us oxygen air o xygen helium mix ture	Mainly f r therapy of chroni pul monary dis ases Also us ful in pul mona y edem	Int rfe es w th ous r tu n to right heart so contraindicat d in fo ward failure Espe ially u eful in hypoxia due to improper mix ing of gases and for pushing xygen cross impair d membran s (s e p ge 150)
Oxyg in jector mask (B ach) m t red for p sitive pr sur	Po t ve p e su in expi ati n Us d with oxyg n	Ad ocated fo pulmona y edema	Le t ffi i nt Pos ti e p es ure appli d at wrong plac in re spiratory cycle to be of b n fit Also very ti ing to breath again t sistance
Comm cial e us ita tors of th su k and blow type *Stephe s n, Em son E and J etc*	P s t pre u e in inspi a tion and neg ti pr ssur in xpi ation *Gene ally em ploy oxygen*	R su c t i o	Mo t eff ctive me ns of resus itation Least interfe en with ardiovascul r dyn m ics altho gh the usual pr ssur elationship in inspiration and ex pir tion i r versed N gative ph s m y c us pulmonary edema in p edisp sing conditions
K ss im n hand bellows	P t in in spi ation.	R u t t on	I expens e esusc ta t r u eful m inly wh n more expen i app atus a re not vail bl

Bennett Positive Pressure Therapy Unit

The Bennett unit is one of the most efficient of the available pressure breathing devices It may be used with an intermittent nebulizer or with Mist O_2 Gen® continuous nebulizer for good humidification (or for administration of various antibiotics vasodilators and surface tension lowering agents) It is a particularly useful way to administer aerosols for it drives them down into the terminal bronchioles and alveoli Excellent instructions are supplied with the unit A special apparatus is also made that cycles automatically Clinical indi tions and uses are as follows.

1 Bronchial asthma Especially with a bronchodilator useful mainly in the acute attack
2 Chronic emphysema idiopathic or accompanying fibrosis pneumoconiosis etc Best results apparently wh n bronchodilators are used Must be used cautiously or with automatic cycling in patients with severe hypoxia and elevated CO_2 tension (See dangers of oxygen therapy page 145) In these conditions therapy must be employed 2 4 times daily for about 20 minutes per treatment Treatment is given in courses of 5 30 days which may be repeated as indicated
3 *Bronchiectasis As for emphysema above Antibiotics by* aerosol are often useful in this condition
4 Pulmonary edema Especially useful when associated with severe anoxia Must be used with great caution if shock (forward failure) is present
5 Irritating gases and fumes Very valuable especially with any associated pulmonary edema Use u til lungs have cleared
6 Atelectasis S e page 138
7 Respiratory depression Mu t be used with caution if circulatory failure is also present
8 Right heart failure Helps correct hypoxia reliev s burden on right heart Excellent in managem nt of acute right heart failure in conjunction with other measures (see pag 182)

Caution

The Bennett apparatus must be used with great caution in all *cases of periph ral circulatory collapse* or shock (forward failure)

MAINTENANCE OF RESPIRATION BY ALTERATIONS OF CHEST WALL PRESSURES

Although failure of ventilation may be c rr cted by pres ure breathing devices applied to the airway this m thod is not always readily available and cannot be employ d for long periods of time In such cas s respiration can be *maintained by applying pressu e* variations to the heat wall When these methods ar employed the normal intrapleural pres ure relationships are maintained Th usual methods are outlined on the following page

PRINCIPAL METHODS OF PRESSURE ALTERATIONS TO THE CHEST WALL

M th d	Pre u e Du ing Re piration	Indic tion a d Use	R marks
A tif cial respir tion	Th be t m th od t use is to pull on a m t expand hest f in pi tion pre su e f r xpi ti n (e b low)	All p tory f lures whe n oth r method is vail bl	E t ely phy iol g al wh n prope m thod is used (s e pag 152)
Body spi t r	Neg tive p e u (s c ti n) for in pi tion usual ly u d M y us p sitive pressur (x piration) in attempt to o ome e po lung	R spirato y failure when p ol g d aid is eeded	Sin e neg t e press e pplied to entir body m y dumini h ard a f ll g du t pooling of blood in extr mit e nd t nk may b dang ou in forw d failu e
C i s r spi to		A fo body respi tor especi lly in c nv l sc t o tabili d pol omyel ti	M e phys log c l than body r spirator L s i t rf r n w th i c lation Oft om f rt ble r ha d t fit fo p olong d tim Un atisf ct y in e ly re poliom t tl
R cking bed	R p ti c ntrolled mainly by abd minal c nte ts drop ping away from or pu hing di ph gm	Le e d g ea of p ratory f il a ab	M m t ll t f imp oving l ul to y dynam c a d nal drainag i p tients with mbi d r pi a to y nd body pa alysis

ARTIFICIAL RESPIRATIO

A t fici l r pi at o m t be dmini t ed p omptly to a per on wh sp at s h d wheth d to d owning suf foc t o el t h k r oth d nt l c a *Manual arti ficial respiration should never be po tponed while wait i g f r the arrival o institution of treatment with a mecha ical resuscit tor*

This p oc du pla s pont ou spi tion and p vid s o yg n to th ti s s until th p lyz d re p to y ce t c ers and e um its m l fun tion A l g a th h t n tin t b t the p tie t h a ha f co ery and thi m y occu e en ft r many hou f artifi ial r spi ati n

The p sh p ll m thods of rtif ci l r pi ation a m than twi s eff ti as th impl p h m thod (e g Sch fer)

C <u>Drugs and Concentrations Employed</u> (Should be prepared fresh d ily) Th frequency and duration of treatment depends upon the disease and its severity

1 Antibiotics
   a Penicillin Usual dose is 50 000 100 000 units per treatment Dilute in 1 0 2 0 cc of water
   b Streptomycin 0 25 0 5 Gm in 1 0 2 0 cc of water
   c Oxytetracycline (Terramycin®) aerosol 50 100 mg in 1 0 2 0 cc 75% propylene glycol

2 Enzymes
   a Although trypsin (Tryptar®) has been advocated to dissol e *thick tenacious mucus or dead tissue in chronic bronchitis* or bronchiectasis untoward reactions and bizarre changes in cells have been observed with its use It must be used with great caution following instructions aref lly Dosage 1 3 cc of trypsin solution (40 000 units/cc) prepared by dissolving the dry powder in a sp cial b ffer (pH 7 1) Administer 4 times daily for up to 4 5 days for each course Do not employ within one week after frank hemorrhag May be combined with peni illin streptomycin and bronchial dilators
   b Other enzymes have been used (e g desoxyribonuclease (Dornase®) but must still be considered experimental

3 Bronchodilators
   a *Isopropylarterenol (Isuprel®) 0 1 0 5 c of 1 100 or* 1 200 solution
   b Epinephrine (Adre aline) 0 5 cc of 1 100 solution

4 Surface tension lowering agents Various surfa e tension lowering agents have been ad ised to aid in spread ng and formation of aerosols Their value is still uncertain Among these drugs are Ale aire® ethyl alcohol etc

D <u>M thods of Admini tration</u>

1 Oral inhalation during inspiratory phase For the greatest effect and efficiency th aerosol should be inhaled through the mouth
   a Continuous pressure from oxygen tank (see lower dia gram) A Y tube is inserted between nebulizer and source of pressure N bulization will occur only wh n the unattach d end of the Y tube is closed by the thumb or a finger there is usually a few seconds delay before the aerosol arrives at the mouth piece
   b Intermittent pressure (e g foot bellows or pump) is applied during inspirati n

2 If the p tient is unable to cooperate the nebulizer m y be used with an oxygen ma k wh ch *has a rebre thing* bag at tached The nebulizer is placed between ma k and oxygen

Chapter 7

DISEASES OF THE HEART

CONGENITAL HEART DISEASE

C g t l diso d f th h a t whi h amenabl to s r gic l cti n a p e ted b low

Alth gh m y sta th d gnos s f g nital hea t di a b m d l m l gro d al n most a s equi e p i l st d s whi h e b st p f med n m d l c nters w h p oced as di c cath t i tion v no nd r t ograd t l a giography and t m gr phy a n t u tabl f th occa s nal inv tigat o th y a diff ult to p rfo m a d inte p t d r qui skill d t amwo k

T t l gy of F llot (C d No 413 0x0)

All child n w th th t t l gy f F ll t hould b op ted up b es f w l th ag of 21 if unt e t d Syn p is an g t i di at fo p t on B aus of th high r p tive m tal ty rat i th dult ag g p pat t ov th g of 21 a e op r t d p n only if th y e s ly d sabl d

S g l t tme t s st th of th di ect (B k) p oc d e th i d e t (Blalock T sig) p ed B k s nfu d bul e t n (if the ob t ct on in th nf d b l m f the right t le) and p lm na y v l lot my (if th b t t on val la) a e p b bly th p o d es of ho e in pable h d

P lm y St With N m l A t R t (Cod N 413 0x0)

Th o d t n fo m ly d d r n w r gni ed a b i g of th mo t omm o g it l l i s D p nding pon th e ty f th l s th p t nt m y b ymptom t c m y how ll deg s of d d bil ty p t ev di f il w th l w dia tp t

If s t a s i manife t (ight v nt i ul y tol c pr s f at l a t 75 mm Hg) g l t e tm t ndi ted S g y s ts f d t p lm y val lot my (if th te i i v lvul) o infund bula es t n (if th ob t t nfund b l) o both

If th t o mild th pati t may be ymptom t fo y

Pulmonary Atresia (Code No 4711 018)

In this variety of tetralogy of Fallot the pulmonary artery is atretic an anastomotic procedure (Blalock) is advised

Tricuspid Atresia (Code No 452 017)

This condition is re ognized by the combination of a centrally cyanotic congenital heart lesion a dominant a wave in the venou pulse and evidence of left ventricular hypertrophy clinically and electrocardiographically A Blalock anastomotic operation is the treatment of choice

Patent Ductus Arteriosus (Code No 40x 0x0)

This relatively common lesion varies in severity from complet absence of symptoms to frank cardiac failure

The indications for ligation of a patent d ctus arteriosus in the presence of pulmonary hypertension have not been established Current opinion favors ligation whenever the flow through the ductu is permanently or intermittently from left to right

Because of the low operative mortality rate (less than 1%) in skilled hands ligation is recommended in all individuals under the age of 20 perhaps 30 The question of ligation versus division is not settled but the latter has a higher mortality rate The mor tality rate also becomes higher as the patient becomes older This necessitates caution in recommending surgery in adults who are asymptomatic and have no left ventricular hypertrophy

Coa ctation of the Aorta (Code No 461 018)

This condition is characterized by elevation of the systolic blood pressure in the arms but not in the legs a weak d layed femoral pulse as compared to the radial and brachial pulses a sys tolic murmur heard at the base of the heart anterio ly and posteri orly and signs of collateral circulation circumventing the constric ted aorta If the details of the narrowed aorta can be visualized the diagnosis can be established by retrograde carotid or brachial arteriography or venous angiography

Resection of the coarcted site is a more formidable operative procedure than ligation of the patent ductus arteriosus and the sur gical mortality is in the neighborhood of 5% even in the best hands For this reason not all physicians recommend routine resection in asymptomatic individuals The risks of the disease are such how ever that if a skilled cardiological surgeon is available all co arctations up to the age of 20 years should be resected Between the ages of 20 and 35 surgery is advisable if events make it clear that the patient is doing badly

Atrial Septal Def ct (Code No 432 0xx)

Surgical correction of atrial septal defect is now possible but the exact surgical procedure of choice has not been establish d as yet The results are promising but in view of the limit d experi ence surgical repair should be advised only in those patients showing advancing cardiac failure

Anomalous Pulmonary Venous Drainage (Code No 486 02)

Su gical correction of a o nalous p lmonary vein drainage is in the exploratory stage

HYPERTENSIVE CARDIOVASCULAR DISEASE
(code No 400 533)

Hypertensi p r se is manif station a hemodynamic sign a d th ou of the dise is adversely aff cted by

1 Ca diac fa lure se ondary to inc eased work of the heart nd r lative or abs l t coronary insuffi iency
2 The development of atheromata e p cially in the ebral d co onary arte es with syndromes resulting f om vas la occl sion
3 Acute vascular necroses resulting f om apid sustained rises of diastolic blood pressu usually exce ding 130 mm Hg which p od c the c mplication known as the malignant phas Renal fail re o urs almost exclusiv ly in this last group

Evaluation of the Hyp rtensive P ti t

A Hyp t i n is a onspe if gn and may be pr sent in a v riety of disea m of which ar curable o can b modi fied by tre tment The first t p in the t atm nt f a p tient with elevat d d astolic blood pres r is to re gnize ct ible re ible conditions in which hypertensi n occ rs Thes dise es i cl d unilat ral at ophic kidn y often with pyelo phritis ob t ctive uropathy ph och omo ytoma Cu hing s dis ase vi ceral angi t s coarctation of th aorta a d acut glomerular n ph tis

B The ass s m nt f the severity of th vascular hyp te s on and the int g ity of th vital o gans commonly aff cted by hyp tension (heart brain fundi kidn y) m st be det mined bef th rapy an be plann d

Clas if cation of S v rity of Hyp rtension and Its Compl at ons

Hype te n may b la if d a follows

A Sev. e P pill d ma o oft exudates in th fund c d f tl di abling dyspn a disabling co ona y insufficier y ep t d br l th ombo i with ne ological seq la rapid ly adva cing di st li hypertension with p og iv left ven tri ula hyp rt phy

B Mod t S gn of left v t icula hyp rt ophy rte i l t i ha ges in the fundi old eb l th ombos s with seq la a ily o t olled c onary insuffic! y

C Mild Dia t li blood p essure b low 125 with minim l or no bjectiv sign of v s lar d mag in fundi h a t b a n o kidn y

M thods A ilabl fo Low i g Bl od P ss

A D ugs (S p 158)
1 Rauw lfia ompound
2 Verat um ompound
3 Hydralazi hyd ochl de (Ap soline®)
4 M thonium ompo nd
5 Thi ya at a d nitrit

B Sympath ct my

C Low lt i e diet

D Oth s (e g p y hoth rapy sedation)

Indications for Potent Hypotensive Drugs and/or Sympathectomy

A Definit In h ations,
1 Malignant hypertension
2 Hypertensive cardiac failure when acute myocardial in farction has been excluded (if possible)
3 Rapidly advancing diastolic blood pressure with left ven tricular hypertrophy and dilatation Evidence of deterio ration in the heart and fundi (exudates and hemorrhages) especially in young (particularly male) individuals

B Possible Indications (in E ploratory Stages)
1 Recurrent mild cerebral thrombosis with neurological sequelae
2 Intractable coronary insufficiency
3 Asymptomatic men with diastolic blood pressures between 125 and 130 but without oth r evidence of complications of hypertension
4 Severe intractible hypertensive headaches

C Not Indicated With Present Knowledge
1 Mild benign essential hypertension in middle aged women without objective evidence of vascular deterioration or com plications
2 Early transient hypertension in young individuals without objective evidence of vascular deterioration or complications

Hypotensive Drugs

Many patients with hype tension especially middle aged women *live* many years in comfort Therefore great care should be *exer* cised and a clear indication of significant decre se in the span of life obtained before subjecting these patients to the disagreeable side effects and potential dangers of a continuous program of drug *therapy Hypertension va i s strikingly in severity in different* patients treatment at present should be vari d depending on the severity of the hypertension and the presence of complications

Several drugs are now available but the ind cations for th ir *use are still not clearly defined Patients with moderate or s vere* forms of the disease sho ld be givtn the benefit of a t ial of therapy Use the least toxic drugs for mild hypertension Over a period of months or years slight to moderate lowering of the blood pressure may prevent or decrease or possibly reverse the vascular comp *l* cations of hypertension Combinations of drugs have been used and may prove to be useful but they are difficult to ev lu te The addi tion of rauwolfia is best tolerated since th complications from its use are least

In most severe cases h xamethonium should be considered but in some instances of less se ere disease it will be worthwhile to begin with rauwolfia and then either dd another drug or change to a more toxic drug if rauwolfia is not effective

A Ra wolfia Drugs Ra wolfia is the most recent *addition to the* list of hypot nsive d ugs it has a relatively slight hypotensive action but may be useful becaus of its mild s d tive effect a d its value as an adjunct when combined with hexamethonium or Apresolin ® *It is the least toxic of the hypotensi e drugs* nasal stuffi ess is the m st annoying side eff ct D sage
1 Reserpine alkaloid (Serpasil® Reserpoid®) 0 5 mg t i d orally

2 Alse oxylon alkaloid (Rautensin®) 2 mg q i d
3 R dixin® 100 200 mg daily
4 R uwil id® 2 mg t i d orally

B V at um Compounds Th e compounds h ve n v r r c ved um sal f be se of the nar ow margin between th therape t c ffect of the drug and the toxic ffects nausea vomiting and weakne s More re ently p rifi d prepa ations pa t cularly P otoveratrine® have been found u eful pe cially i hyperte ive em gen ies In these situations (heart f ilur complicating acut eph itis the convulsions of e lamp sia hype t nsive p lmonary ed ma) g ve P otoveratr m® in the f llowing dosag s

1 I V 1 5 1 9 micrograms/Kg The hypot nsive effect lasts 1 3 ho rs
2 I M 1 2 micrograms/Kg ev y 8 hou s
3 Orally For treatm t of chroni hypertension gi 0 4 1 5 mg t i d or q i d after me ls (av rage d) Th dos m st b carefully r gulat d and at tim s a difference a slight as 0 5 mg may make the diff ren betwe n s dden vomiting the abs of ympt ms

C Hydralazin Hyd o hloride (Apre line®) The initial do ge of this d g 25 mg orally t i d pr gr ively in reasing to a total do g of 300-400 mg a day The results of the oral use of this drug s a sol method of therapy a e often not im pressiv b t some patie ts obtain a hypot nsive ffect Be a Ap olin ® is the only hypote iv gent whi h i cre se th renal blood flow it has b n u d mo e r ce tly as an ad junct to o al h xameth n um

Th t xi sid ff ct r common th most impo ta t a e h da h a d palpitations with tachy ardia A synd ome re embli g diffus ollagen dise e ha occ ed in some patie t

D Hexam th lum, Th most potent hypot nsi ag nts e the meth nium compounds hexam thonium and the n w p pa tions (e g Ansoly n®) H xameth nium ca be d ith orally s bcutan usly or int av ously and the ommon fo ms a e th bromide chlo id and bitart at At the p e s nt tim the oral ro t has the disad antage of affo ding o ly small nd irregula bs rptio f om th ga trointe tinal tr t with resultant unpredict ble f lls in bl od p es re f thi son oral h xameth nium is oft n un tisf t ry

1 Basi p i ipl s
   a Th pati t should be in th hospital unde lo s pe vi i
   b Th initi l do should be m ll nd hould be inc e d gradually d pendi g pon the e tion of th pati t
   c Th d gr of hyp t nsi n sh ld b only mod t i th fir t we k r and no attempt hould be m d t l r th pre re to normal until it ha be n d m trat d that the pati t an tol rate yat lic pre u e f b t 160 mm Hg witho t hypot nsi sympt ms
   d The po t ral hypot i whi h is g t st t th n ight of the eff t of th d g should be onsid d not only a p t tial da g to th pati nt b t l o a th rap ti w pon to p olong the hypot i ti of th d ug aft th pe k ff t ha worn off

2 Oral hexamethonium The initial dose is usually 125 mg of the ion and may be repeated at 6 to 8 hour intervals usually given 20 minutes before meals If no untoward effects or unusual hypotension occurs the dose can be increased to 250 mg t i d The dose can then be increased the average final dose usually approximates 2 to 3 Gm a day A trial *of 2 or 3 weeks is usually required before* the dose required to lower the blood pressure to a level approximating 160/100 can be determined

The patient may then be seen as an out patient and the dose gradually increased to that level which produces the desired fall of pressure Whether the desired level of pres sure at the time of peak action is in the range of 150 160 systolic or is that which results in mild hypotensive symp toms on standing has not been determined Constipation is to be avoided in patients receiving oral hexamethonium be cause it increases the absorption of the drug laxatives *should be given to ensure a daily bowel movement*

3 Parenteral hexamethonium The initial dose is usually 2 5 5 mg *of the hexamethonium ion given subcutaneously* If no untoward effect occurs the dose can be repeated in 12 hours On the second day 5 mg may be given twice at 12 hour in tervals and the dose gradually increased On discharge from the hospital in 2 to 3 weeks the average patient receives ap proximately 75 mg of the hexamethonium ion twice daily In some patients it may be necessary to give the drug 3 times a day but the increments should always be made gradually and the patient observed several days before increasing the *dose Particular caution should be exercised in older* patients to avoid lowering the pressure too rapidly this is true also of those patients with evidence of atheromata in the cerebral or co onary arteries beca se acute hypotension may result in thrombosis of these vessels

In patients with cerebral or coronary arteriosclerosis Wood advocates the use of anticoagulants beginning a week prior to the administration of hexamethonium to lessen the danger of thrombosis

Following discharge from the hospital the patient should be seen at frequent intervals and the dose increased or ad justed so as to achieve the desired effect without undue faint ness or side effects In some patients it may be necessary to have the patient lie down for an hour after each injection to prevent a postu al hypotension which may produce severe symptoms during this period In many of these patients however tolerance gradually develops although mark d hypotension may still occur on standing the patient may be *able to sit or walk immediately after an i jection* Patients should be warned to avoid motionless standing for an hour or so after an injection shaving waiting in line for a bus and similar activities should be particularly condemned

4 Hexamethonium in acute hypertensive emergencies In acute hypertensive emergencies give hexamethonium intrave ously at a rate of approximately 1 mg per min te to a total dos age of 10 20 mg depending upon th *response of the* patient The most important of these is acute pulmonary

edema associated with a marked rise in blood pressure oc curring in hypertensive pati nts with left ventricula failure Dramatic imp ovement in the pulmonary edema under these circumstances may occur G eat caution must be us d to give the drug slowly and to stop th administ ation when a moderate fall in press e has been chieved A furth r fall in blood pressure may occur for a time after the drug is stopped

5 Side effects and hazard of hexamethonium
   a A ute hypotensive falls in blood pressure are manifest d by faintness w akness and nau ea and vomiting and the pati nt should be in truct d to lie down immediately when thes occu and place his feet high r than his head Unless the hyp tensive effe t is too severe the symptoms pass off rapidly with this po tu al assistance If the symptoms and the sever hypotension pe sist g ve a vaso pressor drug such as N osynephrine® o Va oxyl® s b cutaneously or a slow ontin ous infusion intrav nously of L art rnol 4 mg /liter (s e p 33) If th do e of hexam thonium is v ry g adually incr ased the cute sev re hypoten iv falls are in most cas s avoid d
   b Acute or progressive r nal failure d e to d cre ed r nal blood flow or filtration p essure may r quire dis ontin uation of the d ug If the d se is increa ed gradually this is u ually obviated
   c Vascular thromboses e a hazard in older pati nts who suff r s vere hypot n ive falls but if the p e autions out lined above ar taken this complication is quite rare
   d A low sodium diet potentiat s the a tion of h xamethonium and if an individual re eiving fixed doses of the drug is given a low sodium di t hyp t n ive symptoms may oc ur To obviate this it is usually d sir ble to place the patient on a 1 5 Gm sodium di t at the onset of therapy
   e Al ohol hot limate and vasodilator drug potentiate the action of hexamethonium and th se po ible sou c s of danger should be kept in mind
   f Para ympathetic ffe ts (d e to para ympathetic blocking) Blurri g of vision constipation and dryness of the mo th can be cor ct d in part by the us f eostigmine o ally in 7 5 to 15 mg d ses

S gi l P ocedures
   A Sympath tomy The th rape ti val of sympath t my has be n highly ontrove sial altho gh mo t a th ritie agre it p longs life when us d in e ly malignant hyperten good renal function
   B Ad nal ctomy This radi al p ocedure ha been t di d pa t f w y a s The result hav not b en imp e sive though s me patients with sev e hypert nsi n have con id rable ben f t

Low odi m Di t
   A rigid low sodium di t ontaining 350 mg f Per day has be rec tly populari d it i effe tive Port on of cas s b t th diet is rigorou d ma y

difficult to continue the diet for the months and years required at present it would seem to be indicated only in the moderate forms of hypertension in which drug therapy is not to be used The diet should also be used as an adjunct to the use of the hypotensive drugs *For details of the diet see p 53*

Psychotherapy

Considerable evidence is available to indicate that the hyper tensive patient often has emotional conflicts particularly of the sort related to expressions of hostility and of dependence and inde pendence emotional disturbances resulting from the existence of the hypertension itself must also be considered Such emotional dis turbances are undesirable because they aggravate the degree of existing hypertension and increase the loads on the heart and kidney Attempts have been made to treat hypertensive patients with psycho analytic methods b t the effect on the blood pressure has been poor even though symptoms may often be improved Revers l of hyper tension following psychotherapy has been ext emely rare Atten tion to the emotional needs of the patient is an important adjunct to oth r methods of treatment but should not be the sole method of treatment except in the mild benign forms of the dise se in which drug or surgical therapy is not indicated

Other Methods of T atm nt

A Sedation Nervous tension is freq ently found in the hyper tensive patient and may aggravate his illness In ma y cases sedation either used alone or as an adjunct to other forms of medical therapy will be of decided benefit Phenobarbital is the drug most commonly used Dosage 15 30 mg (1/4 1/2 gr) t i d to q i d

B Drugs which have evoked little general enth siasm despite occasional favorable results beca se of the unpredictable effects on the hypertension and the high incidence of unpleasant side effects include Dibenamine® the di hydrogenated ergot pre parations Priscoline® and potassium thiocyanate and the long acting nitrite

Tr atment of Complications

The cardiac cerebral and renal complications of hypertension are discussed under congestive failu e (see p 182) angin pe toris and myocardial infarction (p 163) cerebral hemorrhage and throm bosis (p 349) and renal failure (p 301)

H adache

Much of the headache of hypertension is on an emotional b sis Suggestion and explanation is often helpf l Hypot nsive drugs are most effective in relieving severe he dache associated with the malignant or pre malignant phase of hyp rte sion

CORONARY HEART DISEASE

Cor na y In uffi i cy

Co onary in uff y s a dynam c co ept wh h i onc rn d with th balance between the blood fl w in the o a y a t a d the d ma d f th my rdium f bl od Co ona y nsuff c ency xi t wh n v th r quirement of th myoca dium for xygenated blood eds the fl w of blo d of th myoc rd um at any in ta t

Co onary insuffic ency m y be c te and t n ent n whi h ca it is giv n th nam f a gina p t s t may b acute pro tracted and s ociated with myoca d al nfarct on o it may be sub ut mod t ly p otracted a d witho t myo dial n is b t linically e gn bl and thi ha b n all d oronary failure by Blumga t a d hi oci tes and is tho ght to repres t o I n f a l t ly min r co na y t y w th uff t ollat ral c r ulat n t p v t my c rd l n c osis It should be t at d sim l ly t a mild infa ction

ANGINAL SYNDROME
(Angi a Pectoris) (code No 401)

On m st di gn se angina p to by p s t v di gnosti te i t by x l s on Th diagno d p d p n p op t p etation of car f l histo y and an a u ate evaluat on of th r dib l ty of th p tie t

Diagn s

Th d nal ymptom of th a ginal ynd m i pain ind d by ything that inc as s th w k of th h rt Pain i ually s b t rnal b t m y b p dial *The o set is s dden b t not in* stant us it cha t is that f p es o a sq e i g sensa ti n f s gnif ant b t sho t d at n a ly la ting mo th n 15 20 m t s and p ec p tat d by ti n e item nt ld nd h vy m ls

T tm t f the A t Atta k

A Spe if M Th nit it are the d gs employed

1 Gly yl t nitrat (nit ogly ine) is the d g of choic it *cts in abo t 1 2 mi t* As soon s att k b gi s pla a 0 3 mg tablet (1/200 g) unde th to gu and allow it to di ol The d m y b incre sed to 0 4 0 6 mg (1/150 1/100 gr) if n li f i bt ined from a small d Nit ogly rin m y b us d f ly wh eve an tt k oc s o may be s d in rd t p e ent a ttack It may ca head h

2 Amyl nit it 1 pearl rushed nd inhaled a t in about 10 se ds Thi d g usually c s s dis gr bl id *a tions of flushi g of the fa* pounding of th p lse and s metim dizzin s a d he dache Th r t on may b minimi d by inhaling th drug f om a distan o by rap dly pa ing th c h d p l b fore th no Th pati nt oon le rns h w to ary th am t of d g h wish to inhal

3 Lo ger-a ting nit ites and oth r drugs have no pla i th the py of the a te atta k

4 Alcohol 30 60 cc (1 2 oz) of whisky brandy etc may be a helpful home remedy

B Ceneral M as r s. *Rest is* the most important therapy in an attack The patient should cease any exertion and should stand still or sit or lie down as soon as he detects onset of pain and *until the attack is over* This generally is the natural re action of most patients but some try to work the attack off Patients should be warned against this

Pre tion of F ther Attacks

A Specific Meas res

1 Drugs

a Nitrites

(1) Longer acting nitrites Pentaerythritol tet anitrate (Peritrate®) seems to be the most effective of these The average dose is 10 mg t i d a c

(2) Glyceryl trinitrate (nitroglycerine) 0 3 0 6 mg (1/200 1/100 gr) under the to gue just before activity

b Xanthines These drugs may be of some benefit o ally in large doses (see p 204)

c Khellin (visammin) Its use has been r comme ded but the reported results are not convincing Average doses are 40 240 mg orally There is a high incidence of t xic reactions mainly nausea vomiting and dizzi ess

2 Abdominal support Obese patients with protuberant abdo mens who have a gina may have fewer attacks following the use of proper abdominal s pport the mechanism is not clear The Kerr Lagen belt is designed for such purpose

3 Surgical *procedures* These have been employed o ly in patients with severe incapacitating angina pectoris in whom medical treatment has failed the res lts are not good and *the various surgical procedures that have been performed in* the past are rarely used today

4 Production of myxedema by means of thiouracil compounds *or radio active iodine (iodine 131) (see p 372)*

The object of this treatment is to produce a myxedematous state so as to reduce the wo k of the heart Good results *have been reported in about half of the cases of* intractable angina but this method should not be used until prolonged rest and attention to the emotional needs of the patient have made *it certain that o e is not dealing with a transient re* versible coronary insufficiency

B Ge er l Me sures

1 *Avoid excesses The patient must* avoid all habits and activ ities that he knows will bring on an attack

2 Treatment of coexisting disorders especially anemia which *may lead to increased cardiac ischemia*

3 Rest Most patients with a gina do not equire prolonged bed rest but rest and relaxation are beneficial Adequate *mental rest is also important*

4 Diet Obese patients should be placed on a r ducing diet and their weight bro ght to normal or slightly subnormal levels *Some authorities recommend* a rigid low cholesterol low fat diet but the prevailing opinion is that a reducing diet is equally effective The exact role of a special diet in

influencing th co rse of angina pectoris remains to be determin d

5 Tobacco is best avoided or us d in moderation becaus toba co produces tachycardia and elevation in blood pr s sur

ACUTE MYOCARDIAL INFARCTION (code No 430 516 7)

Myocardial infarction is due to necrosis of a portion of the cardiac mu le as a sult of impai ment of its blood supply This impai ment usually r sults from oc lusion or thrombo is of a ronary artery but it may result f om impaired bl d flow as a re ult of hock or a ute an mia from any cau Myocardial in farction vari s qu ntitativ ly f om histologic nec osis to massive inf rcti n All int rm diat degre s oc ur and r sult in v ied clini al f atu s Th infar tion may be es entially asymptomatic

Th on t of angina pectoris may be associated with coronary oc lusion ev n though inf ct on does not oc ur (if th collateral blood flow is adequat) The pr gno is is b tt r than previously tho ght

Di gn is

In typ cal ase th inf ction is haract iz d by seve pro longed c rdia pain simila in location and radiation to that of ngina pe toris it is often ssociat d with shock onge tive fa l u and ar hythmia Delay d manif stations n lud fe r l u kocyto is and levated edim ntation r t Ecg abnormaliti s are typi al with haract ristic changes in Q T and ST s gm nts which may be delay d V iati ns from thi typi l patt rn are not uncommon

T tm nt

A Imm diat Tr atm nt

1 Rest Phy i al and m ntal r t in the most mf rtabl positi n is e sential du ing th fi st 2 3 w ks during which tim ruptu of the h art is mo t apt to oc Th p tient sh uld not be all w d to fe d or are fo hims lf during th first f w day unle s th tt ck is v ry mild with o t shock or other ompli ations Sp cial nursing s i highly de irabl A bed id ommod is now ons d ed t quir l ss ffort than the use of a bedpan (unle th pati nt can use th latt r mfo tably)

2 R li f of p in

M rphin ulf t U S P B P 10 15 mg (1/6 1/4 gr) slowly I V (usi s p tient i un on ious) If th p in i not reli d in 15 minut s repe t thi do g Aft r th initial r li f of p in fu th inj tion of morphine an be gi en ub ut s 15 mg (1/8 1/4 gr) as n sary f e li f of pain Th sub utan ous rout of nj tion is used unl the att ck r or th pati t is in h If th pati nt is in hock with ve e pai the v nous u of morphi m y be n ry be poor absorption of th d ug wh n admini te neously *CAUTION Do not gi e a se o morphine if respirations are bel w 1*

Demerol® and Dilaudid® are preferred to morphine by some clinicians in the treatment of infarction they are said to produce less nausea and vomiting

b *Dihydromorphinone Hydrochlo ide* U S P (Dilaudid®) 4 mg (1/16 gr) I M or I V may be used instead of morphine

or c Meperidine Hydrochloride U S P Pethidine Hydro chloride B P (Demerol®) 50 100 mg I V or I M as *needed*

d Aminophylline U S P B P 0 5 Gm (7 1/2 gr) I V very slowly (1 2 cc per min te) may be helpf l if the pain is not relieved by opiates and/or oxygen (see below)

3 Oxygen Often seful and sometimes necessary for the *relief of dyspnea cyanosis* pulmonary edema shock a d chest pain Give by BLB OEM or Bennett mask oral pharyngeal catheter nasal metal inhaler or oxygen tent (see p 147)

4 Reass rance From the onset attempt to allay patient s *apprehension and anxiety*

5 Shock A frequent and serious complication with an esti mated mortality of 80% particularly in those in whom shock is delayed a d appears after the pain has subsided

a Vasopressor d gs Present evidence suggests that vaso *pressor drugs (sympathetic amines) may elevate the* blood pressure and decrease mortality in myocardial in farction associated with shock Shock m st be tr ated early to achieve the best results For details of the use of vasop essor drugs see p 33

b *Digitalis A hypotonic myocardium often accompanies* acute myocardial infarction and shock may be associated with an increased venous pressure Contrary to previous opinion some investigators are impressed with the value of digitalization in the shock of acute myocardial infarction *Digitalization can be a complished as in co gestive heart* fail re The increased card ac output results in increas ed coronary flow and the pressure may rise

c Treatment of cardiac arrhythmias Shock m y be the esult of undetected ve tricular tachycardia or other ar rhythmia and prompt treatment of this complication (see below under cardiac arrhythmia) may be life saving

d Venous and arterial transfusions These have ot be n very effective b t should be kept in mind as adjuncts

6 Anticoagulant therapy This is a controversial matter de spite the official recommendation of the American Heart Association that anticoagulants decrease the mortality and th incidence of th ombo mbolic phenomena in ac te myo cardial infarction Other investigators have challenged this especially in the milder cases (rapid relief of pain minimal signs of myocard al necrosis absence of shock or cardiac f ilure) In severe cases of myocardial infar tion anti coagulants are generally recommended For technic see p 216

7 Sedation Adequate sleep is as vital in patie ts w th myo cardial infarction as it is with those suffering from cardia failure Whatever drugs *necessary should be u ed to p ovide*

suffici nt sle p and morphine d rivatives should not be withheld in the first few days if they are indicated

B Follow p Careful clin al obs rvation is mandatory to det r mi e the patient s progr s One should be alert for evid nce of extension of the infa ction new inf rction the appearanc of complicati ns or symptoms requi ing t eatment

C Treatm nt of Compli tio s

1 Cardi f ilure If ca diac failure develops treat as for failur from any cause Oxygen low sodium intake mercu rial diureti s and ca tious d gitalization are the essentials The patient should be digitalized in such a mann r as to avoid toxi rea tions if possible Rapid digitalization is best avoided unl ss th f ilu e is u gent If the ardiac fail e is mild and manifested solely by p lmonary ral s and increas d dy prea restriction of sodi m and the adminis tration of mercurial diureti s may be sufficient Digitalis is avoided by some authorities I e ause of the h zard of ven tricular arrhythmias b t its well controlled admini tration should not be d fer ed if c diac failure demands it

2 Arrhythmi s

a Ventricular premature beats These a e common and in di ate inc ea ed irritability of the damaged myocardium nd may presage v ntricular ta hycard a Quinidine sul f te is the drug of h ice (p 200) An alternative t qu in d ne is pr in amide (see p 205)

b V t lar ta hycardia is an em gency (see p 178)

c A ri ular f brillation is usually tran ient If thi per sists If th patient tol ates it poorly o if congestive h art f ilure oc urs the pat nt should be digitaliz d with c (e p 197)

3 Adams St kes tta k with he rt block i an merg n y (see p 181)

4 Th ombo embolic phen m na are common during the cou se of myoc rdial infarction If anti oagulants have not bee giv n th y should be pro nptly administered f thrombo emb lic phenomena occu (s e p 216)

5 Ext nsion of the infarction When re urr t pa n oc s days o w ks aft th i itia pain has subsid d tension f the myocardi l n rosis should be susp t d and onf r mation so ght in th el t oc diogram and in othe linical feat s Th same methods of treatment pply s to the o iginal infarction but f th r pe iod of r st is required

A ti ity Stat s in Conval s en e

The m nimum p iod of b d rest should be at le st 3 we k If th inf tion ha be n very sev re this should be inc ea ed to app oxim t ly 6 w eks The prog am f r most pati nts is 1 month f omplet t 1 month of slowly in reasing activity nd a third mo th of r tri ted a tivity p ior to returning to work Th amount of re t should be indi id ualized ac ording to the se rity of the myo cardial infarcti n and th re ponse of the patient

The patient hould not be permitted to w lk freely about the room for bout 7 10 days aft r h is first allowed out of Gradual resumption of activity is most important He on th sam e floo with gradually increa ing periods

always slowly and without producing chest pain dyspnea undue tachycardia or fatigue When he is first permitted out of doo s usually not until 2 months after the infarction he should avoid hills and stairs for another month

CHRONIC RHEUMATIC HEART DISEASE

Rheumatic heart disease is one phase in the rheumatic fever cycle The stage of asymptomatic valvular heart disease without cardiac failure is the latent period between the subsidence of acute rheumatic fever and the terminal phase of cardiac failure The physician endeavors to prolong this latent phase as much as possible

Management of Asymptomatic Valvular Heart Disease

A P opl ylaxi
   1 Prevention of recurrences of acute rheumatic fever
      a Avoid exposure to streptococcal infections
      b Continuous antibiotic prophylaxis in selected cases
      c Prompt adequate treatment of hemolytic streptococcus infections
   2 Prophylactic advice in regard to dental extraction urologic procedures surgical procedures etc to prevent bac teremia and possible subacute bacterial endocarditis

B Cen ral Measures.
   1 Proper vocational guidance to anticipate a later period when *exercise tolerance may be significantly limited*
   2 Early recognition of disturbances of thyroid function anemia paroxysmal arrhythmia etc so as to provide proper therapy
   3 Maintenance of general health at as high a level as possible with good habits adequate diet constant level of activity and adequate sleep
   4 *Avoidance of obesity and excessive physical exertion*

MITRAL VALVULAR DISEASE

This is the most common of valvular lesions It takes from 3 to 5 years for mitral stenosis to develop *mitral insufficiency may* occur alon or more commonly in combination with mitral stenosis

MITRAL STENOSIS (code No 493)

In view of the excellent results obtained *following mitral valvu* lotomy the signs of mitral stenosis should be learly appreciated

D agnosis

A Signs of Un omplicated M tral Stenosis The most important of these are (1) a mid diastolic long murm r always associated with *presystolic accentuation if th re is sinus rhythm* and usually associated with a thrill (2) a systolic murmur which if present is usually grade II or less and is not pan *systolic* (3) a snapping 1st sound and an opening snap

If pulmonary hypert nsion is present the signs of this and of associated right ventricular hypertrophy may be demonstrated

B Ex lus on of Mitral Insuffi i ncy Mitral incompet nc must be xcluded if possibl The m tral valve is op able only if the patient s condition is due to a mech nical obstruction of the mitral valve If th re is no appar nt systolic murmur in the pr senc of the signs of mitral stenosis mitral in omp tence is xce dingly unlikely If there is a loud pan systolic mu m r at the apex in a sociation with an ac entuat d often e rly 3rd heart sound a soft 1st sound and no op ning snap th diagnosis of predom nant mitral incompet n is likely ev n if a hort mid diastolic murmu can be heard at the ap x Left entri ular hypertrophy in the Ecg should make one ve y cautious in re omm nding surge y fo mitral st nosis be aus of the lik lihood of significant mitral in ompet n e If there is a mod rate systolic murmur at the apex the diagnosis must rest on a consideration of the total f ndings

S rgical Tr atm nt

The co se of mitral stenosis is highly variable and n view of the mortality of mitral valvulotomy (3 5%) surgery is not ad vis d in m ld ca s with slight exertional dyspn a and f tigu only I dication f r s rg ry includ th following

1 U ontrollable pulmonary ed ma
2 Disabling dysp e and occa onal pulmonary d m
3 Evidenc of a tive pulmonary hypertension with right v n tric lar hypertrophy and early or gest ve fa l re
4 Systemic and pulmonary emboli
5 Inc eased pulmonary a t riola r istance with mark d d spnea and incre sed P These pat nts a pt to d velop righ hea t failure and emboli
6 Right h art fail re with ri la fibrilLation t i usp d in omp t nc wh n secondary to m rk d mit al st nosis The diagnosis of mitral st no is s d ff ult und th se ircum sta ces and the s rgical m rtality high

AORTIC STENOSIS (code No 499)

Within the past 2 ye r operativ elief of m chani al a rt c stenosis has b en succ sfully a hieved

Diagnosis

A H ri Findings The crit ria fo Lnical diagnosi of ao ti s nos s ar und goi g som r vision b t th lassi signs are (1) loud rough aortic systoli murmu and thrill end ng before the 2nd sound and t ansmitt d to the eck and pex ( ) a h ving api al impulse typical of l l ntric la hyp rtrophy (3) a small sustained and anacrotic p lse and a w k A_2

B Othe Syn ptoms and Signs Th l sion may b symptoma i o as ociat d w ih dy pn prog essing to rdia f ilure syncop and/or angina pe to is

Surgical Treatment

The indicat ons for surgical correction of aortic stenosis are progressive left ventricular failure attacks of syncope due to cerebral ischemia and angina pectoris when thought to be due to the decreased cardiac output of aortic stenosis and not to associ ated coronary disease In the presence of both *mitral and aortic* stenosis surgical correction of both valves can be performed at the same operation

BACTERIAL ENDOCARDITIS

(Subacute code No 450 100 0) (Acute code No 450 100)

These are infections occurring on the interior surfaces of the heart (most frequently the valves) or great vessels associated with showers of large and small mycotic emboli The most common in fecting organisms are Streptococcus viridans and Streptococcus faecalis which cause the classical subacute bacterial endocarditis Bacteremias which may accompany primary infections such as pneumonia may cause *acute bacterial endocarditis due to pneu* mococci staphylococci beta h molytic streptococci Hemophilus influenzae and gonococci

Diagnosis

Symptoms are sually those of septicemia the signs include fever pallor petechial hemor hages splenomegaly cl bbing of *fingers* and evide *ce of valvular or congenital heart disease* Do not make a diagnosis of subacu e ba terial endocarditis in the ab sence of valvular or congenital heart disease or without repeated positive blood cultures showing the same organisms Do not exclude the diagnosis of bacterial endocarditis without repeated negative blood cultures or marrow cultures Occasional typical clinical cases will be found to have r peatedly negative blood cultures *Under such conditions therapy must be started empirically* to pre vent serious damage to heart valves

Treatme t

A Specific Measures The most important consideration in the treatment of bacterial endocarditis is a bactericidal concen tration of one or more antibiotics in contact with the infecting *organisms* which are often localized in avascular relatively inaccessible foci Penicillin because of its high degree of bactericidal activity against the great majority of bacteria which prod ce bacterial endocarditis and because of its low incid nce of side reactions is by far the most useful drug Synergistic combinations of penicillin with other antibiotics have often proved valuable Few cases hav been cured by *bacteriostatic* drugs such as chlortetra ycline (Au eomycin®) oxytetracycline (Terramycin®) chloramphenicol (Chloromyce tin®) and erythromycin (Erythrocyn®) sed alon Po itive blood cultures are invaluable to confirm the diagnosis and to guide treatment and should be combined with tests of sensi tivity of the infecting o ganism to various antibiotics or com binations of a tibiotics Hence one or mo e blood cult res should be obtained daily for 3 to 5 days before instit ting

treatment exc pt in d sp rately ill patient or patients with c te bacterial endocarditis To v id fu ther he t damag tr atment h uld n t be furthe delayed

1 Penicillin This d ug nu t b gi en parenterally in bac t rial endocarditis in o d r t gain eff ctive levels The dos of penic llin used depends on the sensit vity of the o ganism nd this is d termined by doing in vitro sens tivity t sts About 90% of t ins of Streptococ us virid ns f om c se of ub cute ba t rial endoca dit s have b n found t be inhibited in vitro by 0 1 un t of penicillin per c or le s How v r some re quit l t nt r quir ng up to 10 units or more

A minimum s rum on e t ation m ny tim s gr t than the appa ent in vitro sensitivity f the organism must b produced to insur a ba t ricidal con entration n th g tation In pati nt in whom posit ve blood cultur s are not btain d or whe e s nsitivity t sts a not av labl 5 to 10 million units of peni illin hould be giv n daily The e are thr alternativ m thod of admini tr ti n

a Peni illin proc ine Fo organism s n itive t less than 0 1 U p r ml of penicillin giv 500 000 to 1 000 000 nits of penicillin p ocai e I M twice daily

b Int mittent administ t on Fo o gani m ens tive to 0 1 U pe ml of penicillin o mo e intermitt nt intra mus ula inje tions of aqu u p ni ll n ol tion ev ry 3 t 6 h urs

or Co tinuous pa nt ral administ tio If th total da ly dose is approximately 5 milli n r mo unit of peni illin pe day dministration i usually be t compli h d by a ontinuous int amuscular drip (occ ionally i t a n u d ip) Th antibi t c n be d ss lved n 1000 2000 of phy i l gical s lin s l t on o glucos lu ti n

APPROXIMATE DOSAGE SCHEDULES

Pe i llin Inhib tion (Ba tericidal at 72 Hr) Unit p r ml	Total P ni ill n Do ag pe 24 Hr (Milli of Unit)
0 1	1 2 (p illin p ocain)
0 1 0 5	3 4 (qu ous)
0 5 0 9	4 5 (q)
1 0 5 0	5 20 (q ous)
> 5 0	20 500 (qu ous)

Wh n bact mia and f p r i t th dos ge h uld be doubl d nd do bl d until f o abl pon oc Alternat v ly vn gi ti tre in t w th 2 or m bioti m y b d Wh high once t ations of re quired Proben id N N R (B m d") 0 5 (71b g) e y 6 ho r m y be u d to inhibit nal c t n

2 St ptomycin Int mitte t I M inj ti is th

choice and gives as good levels as those obtained by I V *injections* Large doses are advised 0 5 1 0 Gm dis solved in 4 cc (1 dr) distilled water + 1 cc 2% procaine I M every 6 hours should be given Observe for toxicity

3 Combined penicillin and streptomycin Preliminary evi dence suggests that penicillin (5 million units/day) + *strep* tomycin (2 Gm /day) may be the optimal treatment for in fections due to Streptococcus faecalis
4 Chlortetracycline (Aureomycin®) oxytetracycline (Terra mycin®) chloramphenicol (Chloromycetin®) and erythro mycin (Erythrocyn®) While these drugs may suppress the progress of subacute bacterial endocarditis their use is frequently followed by relapse Wherever possible drugs exhibiting more pronounced bactericidal activity i e *penicillin and streptomycin should be the first choice in* treatment The exact dosages and effectiveness of therapy have not been established Nausea and vomiting result frequently from the oral administration of Aureomycin® and may interfere with treatment In such cases the drug must be given I V in doses of 50 100 mg or more every 6 hours

   Although Streptococcus faecalis is generally inhibited by Aureomycin® and Terramycin® treatment with these drugs of endocarditis due to this organism is generally ineffective
5 Other drugs Neomycin bacitracin and polymyxin may be used alone or in combination with other drugs where the organism is insensitive to less toxic antibiotics (see p 514)
6 Combined therapy In infections due to highly resistant organisms synergistic pairs of antibiotics as determin d by tests of bactericidal activity in the laboratory may be used (see p 496) Combined therapy should never be attemp *ted without adequate laboratory control*
7 Duration of treatment The suggested duration of therapy by various authorities is 2 8 weeks Most patients should be treated for 4 weeks after sterilization of the blood str am After therapy has been discontinued the patient should be carefully observed for recurrence by taking repeated blood cultures
8 Recurrences Most recurrences are observed within a week or two of the end of therapy Occasional cases relapse months later The diagnosis of recurrence must not be made on the return of fever and embolic phenomena alone these may occur for up to 6 8 weeks after therapy has ceased Positive blood cultures are essential for the diagnosis of recurrence Before re treating again determin the s nsi tivity of the organism and then give treatment with higher dosages fo a longer period of time or use a different anti *biotic About 70 75% cures are now being reported*
9 Anticoagulants It is generally agreed that the use of heparin or bishydroxycoumarin (Dicumarol®) in the treatment of sub acute bacterial endocarditis is unnecessary and may be dangerous

B <u>General Measures</u> General supportive measures as for any severe infection with fever should be given

C <u>Complications and Treatment</u>

1 <u>Infarction</u> Caus d by emboli breaking off from infe ted

area The infarctions usually occur in o gans in th systemic circulation but if the endocardial lesion is on the right sid of the heart the embolus may be to the pulmo nary c rculation Treatment is symptomatic

2. Cardiac failure (uncommon) Active myocarditis or scar ring of the heart valves may precip tate congestive f il re When giving large quantities of penicillin as sodium salt one may give signif cant amounts of sodium ion Therefor wh n treating a cas of suba ute bacte ial endocarditis with conge tive failure or possible failure us calcium or potassium penicillin (See congestive failure p 182)
3. Anemia Th anemia if severe should be treated by whole blood transfusions (see p 247)

Prophylaxis

A high perc ntage of cas s of endocardit s arise after dental procedures or surgery of the oropharynx and genito rinary tracts Ther fore a.l patient with valvula o congenital heart disease wh are to have any of th s proc dures should be given penicillin prophyla tically A satisfa tory schedule is as follows P nicillin procain 1 000 000 units daily for 2 days before proc dur on the day of the procedure and fo 2 days after th procedure

CARDIAC ARRHYTHMIAS

Cardiac ar hythmia are commonly found in ev ry physi ian s practi e and a thorough knowledge of their diagnosis and manage m nt is essential Clinical manifestations vary from trivial palpi tations to a clinical state of the utmost urgency as when vent icular ta hycardia complicat s acute myocardial infarction

Relation of ymptoms

Th ymptoms p od ced by an a rhythmia depend pon the und rlying state of the heart the ventricular rate nd the duration of the a rhythmia Even a normal h art may fail if the vent icula rate is rapid enough or lasts long enough Ta hyc rdia which may be w ll tolerat d by one individual may produce severe a xi pulmo nary ed ma (g in a patient with tight mitral st nosi) The physician must d cide when to ignore wh n t tre t conservatively d wh n t x rt maximum fforts to t e t n rrhythmia

DISTURBANCES OF AURICULAR ORIGIN

AURICULAR PAROXYSMAL TACHYCARDIA (code No 422)

In this di tu ban e of hythm it is thought that an ctopic focus within the auricle tak ove s the pacemake of th h rt and dis charge impulses at rat varying from 120 320 p r minute betwee 170 nd 210 per minute Th rate is ab l t ly and is not aff cted by respiration movem nt o c rotid s re (unless thi abolish s the attack) A icular ta usually a benign condition unl ss it omplic te severe

disease At least half of the cases occur in individuals without organic heart disease Death during an attack is rare but cerebral ischemia or cardiac failure may occur when the more rapid rates last over a period of days The attacks are often produced by emotional tension are common in young individuals and at times are related to accelerated conduction through the A V node formerly known as the Wolff Parkinson White syndrome Recurrent attacks are frequent so that the problem of preventing attacks is as important as the treatment of the individual attack

Treatment of the A ute Attack

In the absence of heart disease one should remember that serious effects are rare Most attacks tend to subside spontaneously and the physician should not use remedies that are more dangerous than the disease Particular efforts should be made to stop the attack quickly if it persists for several days if cardiac failure syncope or anginal pain develops or if there is underlying cardiac disease

A. Mechanical M asures A variety of methods may interrupt attacks and the patient may learn to do these himself These include the Valsalva maneuver (holding breath and contracting chest and abdominal muscles) tretching of the arms and body lowering the head between his knees and holding the breath

B. Vagal Stimulation
   1. Carotid sinus pressure With the patient relaxed in the semi recumbent position firm but gentle pressure and massage should be used first over one carotid sinus for 10 to 20 seconds and then over the other Pressure sho ld not be exerted on both carotid sinuses at the same time Continuous auscultation of the heart should be carried out so that pressure is stopped as soon as the attack ceases Carotid sinus pressure will inte rupt about half of the attacks especially if the patient has been digitali ed
   2. Bilateral eyeball pressure has been recommended but it is rarely as effective as carotid sinus pressure and carries the risk of prod ing a detached retina
   3. Induced vomiting (except in cases of syncope anginal pain or severe cardiac disease)

C. Drug Therapy If mechanical measures fail and the attack continu s (p rticularly if the symptoms noted abov are present) drugs should be employed There is no unanimity of opinion about the most effective drugs but the following are satisfactory
   1. Quinidine sulfate U S P B P (see p 200)
   2. Neostigmine U S P (Prostigmin®) 1 mg subcutaneously
   3. Digitalis orally or if no digitalis has b en given in the preceding 2 we ks intravenously
   4. Procaine amide (Pronestyl®) (see p 205) Continuous electroca diograms or continuous monitoring of the heart rate and blood pressu e is essential
   5. Methacholin Chloride U S P B P (Mecholyl® chloride) 10 mg subcut is often effective but produces very unpleasant side effects and sh uld rarely be used
   6. Syrup of Ipecac U S P 4 to 8 cc may be used to induce vomiting It may be repeated if unsuccessful

P ev ntion of Att ks

A Attempt t f nd nd remo tf e aus pe ially emotional st ss undue fatigu o ex s ve alcohol or t b cco

B Dr gs

1 Qui idine sulfat U S P B P 0 2 0 6 Gm (3 9 gr) t d to q i d may preve t fu ther attacks f tr y occur frequ ntly s d ar tro bles m B gin with small do es of qui idin nd c a if the atta ks a e not prev ted and t xic effects do n t oc u

2 Should quinid ne fail or if it is not tol rated full digital l ation followed by digi lis in mainten nc do es m y p e v nt d c a tt fr qien y of tta ks (s e p 197)

3 Ma ntena e do of p ocai amid 250 to 500 mg t i d may be t i d if the bo e two methods ar un u ces f l

NODAL PAROXYSMAL TACHYCARDIA (code No 422)

Th s s mbles au icula ta hy rdia e c pt that the ectopi focus is in the A V nod l tissue At time the le t oca d ographic or clin l di tin ti n b tw en u i ular and odal pa xy mal ta hy a d a s ot po sible n whi h c s the f m pra e i u lar tachy rdi is sed T atme t is d o t along the s m li as fo au i ula ta hyc rd (s e p 173)

AURICULAR FLUTTER

(Paroxysmal code No 423) (Chronic code No 424)

Thi arrhythmia is due t impuls s whi h arise from an ir itabl focus of a i ular mu cl t rates of 250 to 350 pe minut The ntr ula rate is u ually one half of th a ri la t (2 to 1 condu t) but th ve tricula te may b les (3 to 1 o 4 to 1 co d tion) or ery ra ely may b 1 to 1 onductio with a v y rapid entr cula r t The v ntri la ate us lly regula b t if the e i a s gnifi nt A V block th ent i ula rat m y be i egul and may simulat a i ula f b il t on A ri fa fl it ually es lt from y f tt c mmo aus f he rt di ease a d it may oc inf e ju tly in the bs n e of h rt dis ase It m y b p od d by quin din d i g the t e tm nt of icula f b illat on

T tm t

A T m t of P x m l Fl tt Sim l r to t tm t t par ysm l t hy a dia x pt that digitali and q i di the d gs of h i e Th ar hythmia t nds to b om tab l shed m r oft n th n does au la o nodal ta hy a d a Prophylaxis f re t tta k is ri d out similarly to that d s ib d f a i l tachy d a (s e p 173)

B T tm t f Ch onl A i r Fl tter

1 D gitali i th drug of choi ti cre ses th A V block a d pre ents a 2 to 1 1 to 1 ond tion In bout half of th s a icula fib illat on inus rhythm sult f om f li digitali tion If u i ula fib illati n m i afte it has b e prod d by digitalis quinidine

be added to convert to sinus rhythm Digitalis may be given by any one of the usual methods (see p 197) Oral medi cation is usually sufficient although the intravenous route may be used if the situation is critical Digitalis must often be given in larger doses than are usually required for cardiac failure When a fixed 4 to 1 conduction is produced by dig italis a slightly increased dose may convert the flutter to auricular fibrillation or sinus rhythm

2 Quinidine sulfate This drug should not as a rule be used to treat auricular flutter unless the patient is fully digitalized with a slow ventricular rate because *of the danger of pro* ducing a 1 to 1 conduction If digitalis results in only a 4 to 1 conduction or produces auricular fibrillation which does not spontaneously convert to sinus rhythm quinidine may be given (*see auricular fibrillation p 176*)

AURICULAR FIBRILLATION
(*Paroxysmal code No 425*) (*Chronic code No 426*)

A common arrhythmia due to ectopic impulses arising in the auricle at very rapid rates (400 500) they often follow variable auricular pathways The ventricular rate is always irregular most commonly varying between 110 and 160 but may be slower or faster depending upon the degree of A V block The chronic form is usually but not invariably associated with organic heart disease especially rheumatic mitral valve disease coronary and hyper tensive heart disease and thyrotoxicosis The paroxysmal type may occur without apparent reason in normal individuals in appar ently normal hearts during acute infectio s diseases following surgical operations especially of the lungs and particularly in thyrotoxicosis

Tr atme t

A Treatme t of Paroxysmal Auricular Fibrillation

1 Specific treatment

a Digitalis is the drug of choice in paroxysmal auricular *fibrillation* especially when this arrhythmia occurs in individuals with organic heart diseas (particularly mitral stenosis) with rapid ventricular rates or when the symptoms or signs of cardiac failure have appeared *If there is doubt as to whether one should use quinidine or* digitalis first digitalis should be given this is because it controls the ventricular rate by producing an A V block which is the immediate objective of treatment in such a case The *objective of t eatment with q inidine is* to abolish th auricular ectopic rhythm and it is quite safe to wait until the ventricular rate is brought under control with digitalis Give full digitali ing doses (see p 197) with the objective of slowing *the ventricular rate to* 70 to 80 per minute and avoiding toxic manifestations In par oxysmal fibrillation there is no clear evidence that the use of digitalis will result in established fibrillation

b In those cases where an attack *of auricular fibrillation* persists in an otherwise normal heart with a ventricular

rate under 180 a d with no oth r symptoms or igns of card ac failure quinidine sulfate may be used at once to convert the rhythm t sin s rhythm

If th v nt icular rate becom s v ry apid or if symptoms of dyspnea anginal pain or severe palpitations are produced onvers on with q inidin sho ld be t mporar ily suspended and digitali giv n

2 Prophylaxis of p xysmal fibrillation The prin ipl s and p oc dure re the same a for auri ular paroxysmal tachy ca di (see p 173)

B T eatm t of Chroni A ri ul r Fibrillation

1 Drugs

a Digitali Th o gh digitaliz tion is the fi st step (see p 197) Th pati t is th n usually pla d on maintenan digitali indefinitely The object of digitali ation i t slow th v nt icula te and to imp ove myocardial ffi ie cy

b Quinidine sulfat Quinidine is used to abolish the topic hythm once the vent icula rate i controlled with dig italis It i pot t ally hazardous and hould be used only i ca fully selected ca by physician thoroughly familiar with th drug nd by a m thod whi h ensures clos medi al supervis on (p eferably in the hospital) whil onversion to inus rhythm s b ing attempted CAUTION S p 200 for danger of quinidin

2 Conv ion of ch nic a cula fibrillati C rent opinion va ies b t the following indic tions for onversion of a ic la fib illation serve a gene al guid Each ase m t be i dividuali d In ge ral conv ion is att mpted wh ve it is thought that th p tient will be bett off with sinus rhythm than with auricula fib illation

a Auricula fibrillation persi ting afte thyrotoxi sis ha b treat d u gic lly o by othe me ns

b A ri ular fib illation of a f w w ks du ation in an indi vid l with no o only slight cardiac dia se

A i ula fibrillation a sociat d with frequ nt emb lic ph nomena

d R fract ry cardiac failur induced by th auricular fibrillation

e Se e palpitatio d e t inability to decre se th ve tricular rat with digitali thi m y be obvious only on e tion

f A icular fibrillatio ppearing for the fi st time po t operativ ly i patie ts with a t chnically s es ful mitral valvul tomy

DISTURBANCES OF VENTRICULAR ORIGIN

VENTRICULAR PREMATURE BEATS (code No 441)

An ar hythmia in whi h ect pic impul s arise from a y point in the ve tricl s to ca s a p emat re beat It i one of th mo t common ar hythmias and oft oc rs in individuals without he rt

Treatment

A Em gency Measures

1 Position The patient should be elevated to the semi Fowler bed position (see p 3) or put in a chair this de creases the venous return to the heart
2 Morphine sulfate 15 to 30 mg (1/4 to 1/2 gr) I V or I M relieves anxiety d presses pulmonary reflexes and induces sleep The attendant lessening of the forceful respiration decreases the negative intrathoracic pressure and the ve ous return to the heart
3 Oxygen when available should be administered in high con centrations This is best achieved by mask or in the case of children by hood or tent Mod rate con e trations (40 to 60%) can be achieved by oxygen tent or nasal catheter Oxygen relieves hypoxia and dyspnea and decreas s pulmo nary capillary permeability (see p 145)
4 Reduction of blood volume
   a Tourniquets Soft rubber or blood pressure cuffs applied with sufficient pressure to obst uct venous b t not arterial flow and rotat d every 15 minutes will effectively reduce the venous return to the heart The tourniquets should be removed gradually as the attack s bsid s Approximately 700 cc of blood may be trapped in th ext emities by this method
   b Venesection (300 to 700 cc) This is the most direct way of red cing the venou eturn to the heart and may strik ingly increase the cardiac outp t and decrease the right auri ular and peripheral venous pressure in low output cardiac failure This p ocedu e should not be done if anemia is present
5 Rapid digitalizat on is of great value (see p 197) Great care sho ld be exercised in giving digitalis intra enously to a previously digitalized patient
6 Aminophyllin 250 to 500 mg slowly I V has been ad vocated Oral aminophylline is relatively i effective I M aminophylline is often painful Rectal aminophylline suppos itories 0 25 to 0 5 Gm (3 3/4 to 7 1/2 gr) may be helpful
7 Hexametho ium In the acute pulmonary edema of hyper tensive heart disease and in the presence of severe hyper tension a slow intraveno s infusion of hexamethonium 1 mg p r minute to a dose of about 5 to 10 mg may be very help ful The infusion should be stopped when the systolic pres sure falls to 170 so as not to overstep the mark and produce hypotension

REFRACTORY CARDIAC FAILURE

The refractory state is said to be prese t when the patie t fails to obtain clinical improvement after the sual therape tic measures outlined above When this occurs the following procedure is advis d

1 Re evaluate the total situation Has the bed rest been ade quate? Is the patie t ing sting more sodium th n ordered? Has h been receiving his the apy car fully? A r view of the patient s activities diet and medications is essential

2 A unrecogni ed ec nt p lmona y inf tion anemia m sk d hype thyroid sm vitamin d f i n y s lent myo dial infa t di o ders of rhythm p nt?
3 Hav mplicat ons such a ute rheumatic myo a dit o s b cut b t i l endoca d t b en uperimposed up a h mati heart?
4 A the e ele t lyte abno malit which m y have lted f om d t merc l d res s if th s have b n s d? El ct olyt dist rb ces may l d to n c l esist ce p d c l w sod um yndrome o in th case of p t um nha d gitali int xicat o

M g m t f C v l

A Sp if M

1 Digitaliz t On e d gitali is in t t t d it is usually ss y t ont th adminl t tion of th drug for lif (e p 196)
2 Low sod um diet 1 5 Gm NaCl (750 mg N) per day (ee p 53) It i d is ble to h k the pati t s s um sod um o ri y sod m f eq tly t be c t in that no d f iency i oc i g A poo odium i t k in th p of s e nal impa m t can p e ip tat f t l enal f il e
3 M rcu ial Th d ugs h uld b u d s f e ly a is n d d v fr q tly as 2 to 3 tim pe we k i p l g d ma nt nanc in o d to em v y cumul ting d ma (p 204) C m b t ken not to e d um d plet on d hydration Som p t e t will pr f th addition of lt to th diet long s m l will emov it f m th body M y pat t h v b n a d be sav d f m eve h onic a diac i v lid m by th lib l b t j d i a f m c ials Amm nium hlo id m y be giv n orally to pot tiate th m rial (s p 205)

B G l M

1 Ad q t t nd x i within tol rance
2 Ca ef l tt ti sh ld be pa d t the f ll wi g
   The t tm nt of th non rd of a diac f il ur (ee p 182)
   b Avoid ble pr ipitati g fa t s (e p 183)

ELECTROLYTE DISTURBANCES IN CARDIAC FAILURE

D ing tre tm t f a diac f il th e typ of le trolyte di t ba es m y be s n

Hypochl mic Alkalos

A M h m Th d e to chlorid xc etio out f p portion to odium l foll wing merc i l di esis This p od c a l w r m hlo d d high rum bi a bonate Th sodium m y be rm l l w nd s um p ta sium levels may be no mal or l w Sympt m f d hydr tion m y be p e t d y m ous m mb an and los of ti s turgo and a lat t or manif st t t y

B T tm t

1 Amm nium Chlo ide U S P B P 4 t 6 Gm (1 to 1½ dr)

per day for 3 to 4 days and repeat after a rest interval of 3 to 4 days
2 *Potassium salts may be added if a deficit exists (see below)* If tetany is present calcium salts must be given concurrently (see p 302)

Low Sodium Syndrome

A Diagnosis The onset of weakness oliguria diaphoresis and azotemia heralds the low salt syndrome Hot weather fever and vomiting are additional predisposing factors Low serum sodium may be present without alkalosis or acidosis or it may be complicated by dehydration and acidosis It may follow severe sodium restriction accompanied by merc rial diuresis

B Treatm nt.
1 Mild cases Increase sodium intake
2 Severe cases Treat with I V hypertonic saline (see p 21)

Hypokalemia

A *This may result from excessive potassium excretion from* mercurial diuresis or the use of resins in patients receiving a low sodium diet Hypokalemia may induce digitalis intoxi cation and is manifested by muscular weakness particularly of respiration

B Treatment Potassium chloride 4 to 8 Gm (1 to 2 dr) daily by mouth provided there is no renal failure CAUTION Par *enteral potassium salts should not be given in the presence of* acidosis or renal failure

PERICARDITIS

ACUTE FIBRINOUS PERICARDITIS (code No 420)

Acute fibrinous pericarditis may be caused by or associated with many diseases The most common are those due to rheumatic fever uremia tuberculosis viruses and malignant disease Acute fibrino s pericarditis generally produces little functional impair ment for there is no mechanical interference with cardiac functio The most distressing symptom is pain and this may be entirely absent It varies from local discomfort to very intense pain which is usually substernal or precordial and may be confused with angina or infarction

Treatment

Treat the underlying condition and provide analgesics as neces sary for relief of pain Sali ylates and/or ACTH or cortisone are useful in rheumatic pericarditis (see p 518)

PERICARDITIS WITH EFFUSION (code No 420 100 8)

The diagnos of p i dit with ff mport nt f r th fluid cumulat on may ca s d d dia outp t d ve o a t rn result ng in ca diac tamponad Thi doe not re sp nd well to th ual me res of the t eatment f d a f il re (i e digitalis low salt et) b t removal of th p i d l fluid may b lif s ving This i inf equently req i d in th om mo v ieties of pe i ardial ff n w th the except on of t b cu l us pericarditis Both the rapidity w th whi h the fluid a mu lates and the amount of fluid importa t d t mining the fun tional imp irment

D gn sis

Symptoms nd s gn incl d pp eh dysp yanos s distended n k v in tachy d p ls s pa ad x s in se of ar of card d lln s f ble or bs t p b t and d mini hed h art sounds P icardial fr ction rub m y b p esent The h st ray e l a wat bottl shaped h a t shadow th E g how low v lt g of the QRS complex a d T wav b o mali t Diagnosti ids in lud d a c th te i t n o v a gioca diography onfirm tio i by p ica dial tap

T tm t

A Em rge y T tm t (P e t) Th ind cat on fo p a dial pa i s s e th ympt m d igns of c d a tamp nade As th per a d l fluid i ses in mount a d p rtic la ly when it in s p dly the v p may rise onsid rably a d th ardi o tp t m y p gres i ly f ll Wh this occu th p tie t becom w k pal nd dyspnei th pulse p b m s v ry na ow nd th pul rapid nd thr ady i th pati nt g s to shock Und r the e ci umstan e th moval of th p ica dial fluid may be lif ving th fluid ho ld be mov d lowly to av d diac d latation or s io rdia fl e

1 Sites f punctu *Avoid puncture of the ventricular muscl*
   - Left 5th or 6th int p ab t l m withi th ea of cardiac dullnes 1 2 cm insid th left heart bo d r as localiz d by x y (o ghly 7 8 m o t id of l ft st nal lin) Th ne dle is p sh d lowly ward d slightly pward If ff ion (p t on ho ld f d fluid within 3 5 m (t tim 7 8 cm)
   - b Epigastric a A b tw n xiph d p oces d l ft st rnal ma gin In ert the dle pwa d t a gl of about 30 and point d towa d th midlin The p i rdium i r ch d at abo t 3 4 cm
   - c P teri app oa h To be ed a l only wh n th above approa hes re un uc e sful rely sed if one s pect a p ul t peri rditis On e t a th 7th o 8th inte pac in th mid pula li Th left arm is levated to rotate th scapula o t f th way Th ne dle is dir ted inward d medially

2 Equipm t

N 16 18 e dle with sh t b vel a d fitting styl t

b No 26 or 27 needle to infiltrate the skin with procaine
c 20 30 cc *syringe to remove fluid Syringe should be connected to needle by a 4 inch piece of rubber tubing to prevent excessive movement of the needle*

3 Technic
a *Clean and sterilize skin over area* to be punctured
b Drape surrounding area with sterile towels
c *Infiltrate skin with 1 2% procaine solution*
d Insert needle (detached from syringe and without a *stylet) slowly into skin* following directions according to site selected (see above)
e *Withdrawal of fluid* When the fluid is encountered it must be withdrawn very slowly sudden withdrawal of the fluid may result in acute cardiac dilatation failure or death Some consider it advisable to replace half the amount of fluid withdrawn with air both to prevent ex cessive dilatation and to give better visualization of the process by x ray With the needle in place remove 20 cc portions after the withdrawal of each portion in ject 10 cc of air
f After the needle is removed a simple bandage over the needle puncture is adequate

B Specific Measur s
1 Tuberculous pericarditis (code No 420 123) The current treatment is to treat the systemic tuberculous infection with bed rest attention to nutrition and other general factors and intensive anti tuberculous drug therapy If the fever and signs of pericardial effusion do not rapidly subside and are still obvious in a month surgical decortication of the pericardium should be considered in order to prevent chronic constrictive pericarditis Judgement is required to determine when the disease is progressing despite medical treatment and when signs of constriction are appearing
2 Rheumatic pericarditis with effusion (code No 420 196 8) Treat as for rheumatic fever The salicylates may help in causing fluid resorption Paracentesis is usually unneces sary but should be performed if tamponade occurs
3 Hydropericardium due to heart failure (code No 420 522 8) Treatment of the congestive failure is usually sufficient
4 Hemopericardium due to rupture of adjacent structure (code No 420 532) Usually post traumatic If fluid accumula tion is excessive *remove fluid at once*

PURULENT PERICARDITIS (code No 420 100 2)

This is usually secondary to other infection elsewhere but is at times caused by contamination of a previous pericardial tap

Tre tment
A Specif c Measures
1 Syst mic hemotherapeutic agents *Tre t infection with* indicated chemotherape tic ag nts (see p 514)
2 Interpericardial antibiotics At the time of removal of th fluid instill 50 000 150 000 units of penicillin or the

app oximat top al am unt f st pt my in o other in dic ted ntibiotic into the pericardial sa d pending on ganisms found (ee p 514) nd repe t wh neve a t p is perform d Ch m th ape ti ag t sh uld b continued as lo g p rulent effusion is p es nt

B G l Me su s
1 P ra nt sis Perform as ne d d t r liev p ure
2 Pericardi t my If fluid is e psulated or pati t is not sponding to therapy surgical drainag m y be n ess ry

CHRONIC CONSTRICTIVE PERICARDITIS
(code No 420 4)
(Tuberculous pericarditis code No 420 123 4)

Thi is due to t b culo p i rditis in most of the ses in th m inder the tiol gy i unknown a f w a s m y follow ut onsp cific pericarditi o tr umatic pe i a ditis

T tm t
A G l M a To combat a cites and co gestive f ilure
1 Low od um diet
2 M ial diur t need d to k ep patient dry (ee p 204) May c mbine this with int mittent ammonium hloride as in c rdiac fail
3 Digitalis is u lly of Littl val e
B S gical Removal of C t i ting Pe i dium This p ocedure n f q tly t a pati nt t mal h alth If o gestiv phe mena a hronic o th pe ic rditi i p ogressiv u gical int rvention is th only method offe ing poss bl ure

NEUROCIRCULATORY ASTHENIA (code No 004 580)
(Da Costa s Syndrome or Effort Syndrome)

Neu oci ulatory thenia i a hroni di order of y ung dults whi h is c nsidered at p esent to b a p ychiatric di o der it is ha teri d by four cardinal symptom dyspnea on ff rt palpi tations left hest pain and a y f tigability The ymptoms re often m re related t the em tional onn tatio of effo t than to the ff rt it elf Examination rev al o clini al findings of heart diseas altho gh ta hyc rdia is oft n pres t

T tme t
A P y hoth rapy d R s ranc The m dical examin tion nd the m nn of handling th pati t hav importa t therape tic v l e
1 M dical examination should be tho ough
2 Th patient should be a d that no o ganic di order xists
3 P ych th r py Furth and m intensive psy h th rapy may be f value
B G ral M res
1 Tre tm t of hyperventilation An acute atta k may be borted by th dmini tration of 5% ca bon dioxid re bre thing in a bag or by holding th bre th Do not giv

ammonium chloride It does not relieve symptoms and may precipitate acidosis inasmuch as fixed base has been lost in compensating for the alkalosis

2 Good hygiene with moderation in all activities a well balanced diet and progressive increase in exercise under supervision and with encouragement

Prognosis

The prognosis for survival is good but is often discouragingly poor for relief of symptoms

PULMONARY HEART DISEASE
(Cor Pulmonale)

Heart disease secondary to disease of the lung or of the pulmonary arteries Emphysema pulmonary fibrosis silicosis a d kyphoscoliosis are common causes of chronic cor pulmonale

Diagnosis

A Symptoms Symptoms of the underlying pulmonary disease may be prese t cough with sputum dyspnea and often wheezing precede the signs of pulmonary hypertension right ventricular hypertrophy and failure for many years

B Signs

1 Signs of pulmonary hypertension Systolic pulsation and *murmur in pulmonary area palpable second sound in pulmonary area* accentuated closely split second sound possibly early diastolic murmur of pulmonary insufficiency

2 Signs of right ventricular hypertrophy Heaving right ventricular impulse in the left parasternal area weak tapping apical impulse presystolic gallop in the xiphoid area

3 Signs of right ventricular failure follow usually with sinus rhythm and with oxygen arterial saturation less than 85%

4 Evidence of central cyanosis and high output state may be present

Treatment

A Specific Measures Appropriate antibiotic therapy for the respiratory infection that so commonly precedes failure in this type of case The patient may be afebrile

B Cen ral M a ures

1 Intermittent oxygen therapy possibly by positive pressure to increase *arterial oxygen saturation and to decrease pulmo n ry arterial pressure* Continuous oxygen therapy should be avoided and the patient closely observed for st por and coma since carbon dioxide retention may occur with oxygen therapy in these patie ts (see p 145)

2 The usual methods of treatment of heart failure should be used (see p 182) bed rest restriction of sod um mercu ial *diuretics and digitalis Digitalis may not be effective* if there is a high cardiac output state

CARDIOVASCULAR SYPHILIS

Ca d ova ul l s may manifest itself a un ompli ated syphil tic aortitis syphilitic o ti in uff i cy saccular o f si f rm an ry m of th ao ta o as a gina pecto i d to invol ment of the ostia of the coronary art rie

The diagno i m y be s pported by a history of syphilis evi d nc of th d s as ls whe in the body (e pe i lly C N S syphili) and a po itiv logi al t t fo syphilis Serologi l tests re negative in abo t 20% of cases

T e tme t

A Specif c M as s
  1 See treatment of late t yphilis (p 440)
  2 Th p uti accid nts s ch as the He xh im r ction are with p nicillin it i ther fo not o d d n c ry t p ecede penicillin treatment with iodides or merc rials
  3 Sever l subsequ nt cou s of penicillin a advis d by some authoriti s at s mi annual o annual int rv l p ially if th a l gy mains posit ve

B G al M
  1 B d t is d s rable during th of t atm nt w th peni illin
  2 S gic l epai of th ne rysm has been ttempted but is best cons d d a b ing in the exploratory stage

SURGERY IN THE CARDIAC PATIENT

P rticula Ha ards of S gery in the C rd c Pati t

A Th u ual ha d f g y a pa t ul ly gre t in surgery of th di pati nt nam ly shock h m rhage anox mia th mb mbolism a d inf ti

B Th bove ha rds may p ipitate any of the f ll wing
  1 C ronary insuffi i y especially if th pati t has co onary di e se
  2 C di c f ilu
  3 C rdi c a hythmi

Cardi Ri ks f A th i

A Hypote sio f llowing preop rativ dation and inducti may pre ipitate coronary insufficiency a d/ rrhythmia
B St ggling d ring ind tion increa th w k of the h rt
C Anoxia is particula ly i s and may o onary insuf fici y ardia f il incre sed pulm nary hype t nsion or ar hythmia

S gi al Ri ks Involved i P rti l Cardia Le ion

A Rh m t H t Di , W th the eption of rtic t osis thes l ions invol haz rds d pending on functional stat s of the l sion
B Hype t nsiv P ti ts A a rule th s patients d a tisf to ily l the b of cardia o renal f il re
C Coronary Di
  1 Gre t t r sk pecially if ece t infarction

2. About 5% additional hazard
3. Postoperative infarction may occur if there is significan fall in blood pressure and coronary insufficiency
4. Adams Stokes attacks may occur

D. Syphilitic Cardiovascular Disease Especially if associat d with angina this lesion suggests involvement of coronary o and sudden death may occur

E. Major Hazards
1. Coronary disease
2. Aortic stenosis especially if angina and syncope are pre
3. Syphilitic cardiovascular disease
4. Adams Stokes attacks

Aneath sia in Cardia Pati nts

A. Surgical procedures in cardiac pati nts require a skilled ane thetist using anesthesia with which he is most experienced
B. Adequate oxygenation must be maintained at all times
C. Avoid cyclopropane except for induction because of danger c arrhythmias
D. Induction m st be smooth
E. Avoid hypotension and treat promptly if it occurs

Management of the Surgical Cardiac Patie t

A. If the patient has had recent myocard al infarction postpone surgery for 3 to 6 months except in th most urgent cases
B. Postpone surgery for at least 3 weeks after recovery from co gestive failure
C. Exercise ca tion when giving fluids containing sodium (in cluding blood) to avoid producing pulmonary edema
D. Treat anemia prior to surgery
E. Treat malnutrition and avitaminosis especially avitaminosis B prior to surgery

THE CARDIAC PATIENT AND PREGNANCY

Status of Patient

If heart disease is present what added risk does pregnan y impose? The following information will assist in making an esti mation of likelihood of cardiac failure

A. Functional class prior to pregnancy
B. Age of patient
C. Size of heart
D. Structural lesion of heart
E. Presence of arrhythmias
F. Socio economic status (e g if childr n are at home or if the patient must work)
G. Intellig nce and cooperation of patient (e g Can the patient rest? Can she stay on a low sodium diet?)
H. Presence of associated disease

F t s Wh ch M y P ip tate Fail in H t D ea

A E ce v w k
B Upper respi tory inf ction odium r t ntion
C An m a
D Par xysmal a hythmia
E E ssiv sodium int k g diet soda bi rbonate in f n of l n plasm o blood
F Rheum ti ti ty
G Others

Assessment of Ri k of H a t Dise s in P gn y

A L itl o N F t nal I pac ty Pr ct lly all pat ts wh are ymptom t c o who have only mild symptoms with d nary activitie m y b allowed to conti e to te m under clo e m di al s pervisi n If th y d v l p mo s vere symptom w th a tivity th y sho ld be hosp tali ed t e t d f fail re and kept in b d until t m

B Mod t o M rk d Functional Incapa ity If the pat nt has p mit l t o d d velop a t pulmonary ed m o has mode ate to m ked symptoms with tiv ty m tral valv lot my should be o s d d Thi ha b n succe fully ac complish d p u til th ighth m th If th patient does n t have an ope abl lesion su h a patie t should be hospitali ed t ated for a diac fail re and k pt n bed u t l t m

C V ry M k d F ti l In apa ity All pati nts seen d ing th fir t t im t wh hav ymptoms on little or o ctivity and who d not h an op abl card c l ion hould be bort ed be se of the high i id n of urr nt failure and d th in this g oup of patie ts

D Sod m should be st icted aft r the s cond m nth

Physi logi al Load Which P gna cy Imposes on th H t

The wo k of th he t in by bo t 50% at th b ginning of abo t th thi d mo th wh n th blood volum and ardia o tp t in e ses Th place ta acts as an art r ove ou fistula Ca dia f il may oc t y time f om the nd of th first trim t up to 2 t 3 we ks before term at which tim the l d f m un ccountable reason decr s

M nag me t of Labor

A C t p n on holds that vaginal d live y is to be pr f d e ept in tho e c es in which th re i an ob t t ical ind ation f ce re n ti Coa ctation of the ao ta may be the only ption to vaginal deli y bec use of th danger of rupt re of th aorta

B The ond tag should be made as short as pos ibl u ing f rc ps wh n possible

C E got te should probably be avoided beca of the incre d wo k of the he rt which follows

CARDIOVASCULAR DRUGS

DIGITALIS AND DIGITALIS LIKE PREPARATIONS

Action of Digitalis and Digitalis like Preparations

A In congestive failure digitalis increas s the force of contraction of the myocardium *and so increases the efficiency of the heart* Digitalis significantly increases cardiac output decreases right atrial pressure decreases the renal venous pressure and in creases excretion of sodium and water and so restores some of *the hemodynamic* and metabolic alterations of cardiac failure The increased cardiac output causes a decrease in venous pres *sure however a direct effect* on the venomotor system has also been postulated

B *In the arrhythmias (especially auricular flutter and fibrillation)* digitalis slows conduction between auricle and ventricle and *depresses the S A and A V nodes both by direct action and by* stimulation of the vagus nerve

Principles of Administration

A Co pt of Dig talis Saturation (Digit lization) Digitalis must be administered initially in large doses in order to achieve tissue saturation and obtain a therapeutic effect After digital ization has been accomplished smaller doses representing the amount metabolized and excreted are administered daily as long as indications for digitalis persist (usually for life)

B Criteria of Ad quate Digitalization Digitalis is administered until a therapeutic eff ct has been obtained (e g r lief of congestive failure or slowing of the ventricular rate in auricular fibrillation) or the earliest toxic effect (anorexia) is reached

1 Congestive failure with normal rhythm
   a *Diuretic action is adequate and edema fluid is lost*
   b Cardiac size is decreased as dilatation becomes less
   c *Venous pressure and circulation time return to normal*
   d Decrease of heart rate results if increase was due to *failure*
   e Engorged tender liver becomes smaller and non tender

2 Auricular fibrillation When the rate is below 80 after exer cising patient one can usually consider the patient adequ tely digitalized The following simple e rcises are adequate
   a Bed pati nts Sit up 5 times
   b Ambulatory p tients Hop up and down on 1 foot 5 times

3 Ecg effects The most characteristic change which digi talis produces in the Ecg is sagging of the ST segment and displ cement of the T waves in an opposite direction *to main* deflection Later there may be a prolonged PR interval The ST T changes can not be used *as criteria of digitalis* toxicity for the effects appear before saturation is present *and p rsist for 2 to 3 weeks after digitalis* has been discon tinued However the Ecg is often of value in d termining *whether digitalis had been* administered in the past 2 3 weeks *and may at times give one an idea of th* amount

C Toxic Effects of Digitalis There are no non toxic digitalis preparations and the difference between the th r p utic and

toxic level i v ry sm ll Th ymptoms of t i ty are a follows

1 Sl ght toxic ty Anor xi
2 Mode at to city Nau ea d v miting h d che mal ise
3 C nsid rable toxi ty D rhea ectopi b ts (e p cially e t i ul) blu ing of vi ion c nfusio d so ientation
4 G ss to i ity S e d rrh abd minal p in h gh deg onductio bl cks and uricul r or v tr cula fibrillati

D The ca dinal p inciples f d gitalis therapy r ma n t e wh the on uses a c ud drug su h as the whole le f or one f the purif d gly o ide of dig t li Th y all h b o dly simil r pharmac logi l ctions d ff ing only in th xt nt of the re ti ns p od ced th y ll b h v simila ly q al t ti ly Th s differ n es m y be utili d to dvant g in th t atm t of th indiv dual patient p ticula ly with re p t to pot cy pe d f tion xt nt of abs rpti and dur ti n f ction

Indi ation and R t f Admini t ti

A I d tion f Admin t t n of D g tali

1 Ca d c failure left ght r mbined with ith inus hythm or uricular fib illation
2 A i l f b llation or flutt w th a r pid e t i ular rate
3 Sup a t i ul pa ysmal t hyc di
4 P io to cardiac u g y pecially m tral v lvulotomy in p ti ts with sinus rhythm that if p xysm l icular f b ill t n ccurs duri g f llowing g ry the v nt icu l r t will ot be easi ly p d
5 The p v ti of p roxysmal a i ular rrhythmi s in p t e t in whom quinidi h s failed o annot b t l t d

B Ro tes f Admi i t tio

1 Or l dmin st t on d in all ca wh ever digit li s need d a d pa nt al dmini tration i ot ind cated
2 P e teral adminiat tion
   a Em rg n y digit li tion
      (1) A te pulmon y d ma o other seve failu Ca tion hould be d in gi ing th full digit lizing do e in a ingl inj ti int v ously unde th e cir um tan e Th d g should b given l wly in di id d do es
      (2) Treatme t of au i la hythmi s when th ed fo control of the ve tri ul at is u g nt
   b Inability t take digitali o ally
      (1) N u ea and vomiting d e t any c u
      (2) Coma
      (3) Postope tiv ly

M thod of Digit li tion

A U t t d C Wh n the pati t has c i d o digitalis p pa ation in th pr ding 2 w ks

1 Parenteral digitaliz tion (need l u g t) *CAUTION Never administ r digitalis preparations I V in full digitalizing dose unless one is certain that there has be n no digitalis tak n in the prec ding two weeks Always give I V preparations slowly*

DIGITALIS AND DIGITALIS LIKE PREPARATIONS

	Gly osid	Pr p tion Avail bl	Digit li i g Dos	Method of Admini tration	Speed of Max im m Action nd Du tion	Maint nc Dos
PARENTERAL	Ouabai U S P B P	1 c amp les 0 25 mg (1/240 gr)	0 25 0 5 mg (1/240 1/120 gr)	0 25 0 5 mg (1 2) dil i d in 10 c line l wly I V f llow with an th drug (b low)	1/2 1 1/2 hours d ation 2 4 d	Not u d f mainte
	Lan t d C U S P (C dilanid®)	2 d 4 mp l s 0 4 and 0 8 mg (1/150 d 1/75 gr)	6 (1 6 mg) (1/40 g)	6 (1 2 mg) I V I M d ll w by 1 2 c (0 2 0 4 mg) I V o I M q 3 4 h until ff t is obt i d	1 2 hou d tion 3 6 d ys	1 2 (0 2 0 4 mg) (1/300 1/150 gr)
	D git n, U S P (Dilute bef)	1 and 2 mp l 0 2 a d 0 4 mg (1/300 d 1/150 gr)	1 2 mg (6) (1/60 gr)	0 6 mg (3) I V I M f ll w d by 0 2 0 4 mg q 4 6 ho rs til 1 2 mg i give	3 8 h r d r tion 14 21 d y	0 05 0 2 mg (1/1200 1/300 gr)
	D g in U S P B P (Dilut befor)	1 mp l 0 5 mg (1/120 gr)	1 5 mg (3 c) (1/40 gr)	1 mg (2) (1/60 g) I V d 0 5 mg (1) (1/120 g) i 3 4 hour the 0 25 mg (0 5 c) (1/240 gr) q 3 4 hour until ff ct is obtain d	1 2 ho d tion 3 6 d ys	0 25 0 75 mg (0 5 1 5) (1/240 1/80 gr)
ORAL	Digitali U S P B P	0 03 0 08 and 0 1 Gm t bl ts (1/2 1 and 1 1/2 gr)	1 0 1 5 Gm (15 22 1/2 g)	0 6 Gm (10 gr) t on 0 4 Gm (6 g) in 6 8 hours 0 2 Gm (3 gr) q 6 ho r f 2 3 dos th n 0 1 Gm (1 1/2 g) b.i.d. til ff t is obt i d.	6 8 ho rs d ation 18 21 days	0 05 0 2 Gm (3/4 3 0 gr)
	Digit in U S P	0 1 a d 0 2 mg t bl t (1/600 1/300 gr)	1 2 mg (1/60 g)	0 6 mg (1/100 g) t on and r pe t in 12 hou a d th n 0 2 mg (1/320 gr) b i d til ff t i bt i d	6 8 hou d r tion 14 21 days	0 05 0 2 mg (1/1200 1/300 gr)
	D g in U S P B P	0 25 0 5 and 1 0 mg tabl ts (1/240 1/120 a d 1/60 g)	2 3 mg (1/30 1/20 g)	1 5 mg (1/40 g) at on and th 0 75 mg (1/80 g) q 6 hour Tot 1 3 0 mg (1/20 g)	4 6 hou d tion 2 6 d y	0 15 0 50 mg (1/400 1/120 gr)
	Lan t d C U S P (C dilanid®)	0 5 mg tabl t (1/120 g)	7 5 mg	3 5 mg (1/20 g) t on 1 mg 6 hou th n 0 5 mg q 6 hou until ff ct i obt i d		0 5 2 5 mg (1/120 1/25 g)

0 25 mg (1/240 g) bl ly i il bl in U S

Sel ct d g d ir d ac ording to rapidity of ffe t ne d d

b Initi l dos g sched l E pt in ma ked me ge y do not give the t re ve ge d git lizing dose in a s ngle dos A good gen ral le is to giv 1/2 to 2/3 f th ve g dig talizing dos imm diat ly and f llow with r mainder in 2 4 four Observ car fully for digit li to icity (se tabl page 196)

Addition of o l digitalis At th time that the in t l dose is given p r nt r lly it s ad s ble to gi or lly an v rag m intenance dose f th prep rat on us d if tt p ti nt i ble to swallow By in t tuting th d g lly rly optimum d g tal ati n ca be achi v d a d main tain d from th st t It is n t ne ss y t gi the s me dig tal s gly sid orally that w s us d f th in ti l m d cat on (g may digital ze with I V Lan toside C and gi e d git lis fol um fo mai t nan)

d C ti must be e r i d A pr viou h story f digi t li the py i ften d ffi ult t obt in beca s th new r prepa ti are i stel s and m y b in tabl t of v i able col rs The patient m y b un war f th therapy h h s b n r c iving

D gitali toxi ty h be n gee in p t e ts who have d i d or w un ware of h ving r eiv d th drug Thi i anoth r s n for avo ding a full digit lizing d in a single inj tio

e Individ l c se f ea h p ti nt No d sag sch d le will fit all p ti nt

2 R p d l digitali tion (within 24 hou) A singl ral digit lizing do i u u lly nw se nce n u and omit ing r c mmo making stim tion of d g e f digit li ti very d ffi ult

M ltipl al d s ar sually qu te dequate and rapid in tion In all c s lo m di al s p r ision i e quir d b i e a h d se A digit li tion appr h d the dr g should be topped t th fi st ig sympt m of to i ity (s e p 196)

Oral Administration of the Digitalis Drugs

U g n y	Drug	How Adm ni t red
Mod at	D git lis	0 4 Gm (6 gr) q 8 ho f 3 dos
	Dig t in	0 4 mg (1/150 gr) q 8 hou f 3 d
	D g n	1 0 mg (1/60 gr) q 8 hour fo 3 dos
Int m diate	D git l s	0 2 Gm (3 gr) t i d f r 2 d ys
		0 1 Gm (1 1/2 gr) q i d f 3 d y
	D git n	0 2 mg (1/300 g) t d f r 2 da
	D g in	0 5 0 75 mg (1/120 1/80 gr) t d f 2 day
		0.25 0.5 mg. (1/240 1/120 gr.) q.i.d. for 3 days.
Lea t	Digit lis	0 1 Gm (1 1/2 g) t i d f 4 5 d ys
	D g t in	0 1 mg (1/600 g) t i d f 4 6 d ys
	D g	0 25 0 5 mg (1/240 1/120 g) t i d fo 4 6 days

3 Slow digitalization At times it is desirable to digitalize slowly over the course of a week especially if the patient cannot be closely observed during this period If this is done any of the preparations can be given in daily doses 2 or 3 times the average maintenance dose for 5 7 days The total digitalizing dose may be somewhat greater than when rapid digitalization is accomplished One must individualize *and no dose will fit all patients* The patient should be in structed regarding the early toxic symptoms when they occur the drug should be stopped for one day and the patient then given the average maintenance dose

B Partially Treated Cases If a digitalis preparation has been taken within 2 weeks give a quart r of the estimated digitali zing dose and then give additional digitalis cautiously observ ing patient s response

Maintenance Dos e and Methods

The oral route is preferred in maintaining digitalization The exact maintenance dose must be determined clinically for each patient (The table on page 199 gives the average doses)

QUINIDINE AND QUININE

Quinidine is the drug of choice in the management of most cardiac arrhyti mias Quinine may be used but is only about 30% as effective as quinidine Only quinidine will be discussed here

Pharmacology

A Actio Knowledge of the pharmacological effects of quinidine is important in order to understand the use of the drug Quinidine has a variety of actions

1 It increases the refractory period of cardiac muscle
2 It slows the rate of auricular and ventricular conduction
3 It decreases the excitability of the myocardium
4 It reduces vagal tone
5 It is a general depressant to smooth muscle

As far as conversion of auricular fibrillation is concerned several of these pharmacologic actions oppose each other the clinical effect dep nds on which of these actions predominates

B Clinical Ph rmacology

1 Route Can be u d orally I M or I V as occasion demands The I V route should be used only by those perienced in the use of the drug and in urgent situations
2 *Absorption Orally quinidine is rapidly* absorbed reaches a peak level in about 2 hours and is relatively slowly ex creted Th re is a slow decrement to about 30% of the peak level after 12 hours
3 Excretion and fate of drug Only 10 20% of orally admin istered quinidine is excreted in the urine the rem inder is metabolized in the body
4 Doses per day After the same dose of the drug is continued for 5 or 6 doses at 2 hour intervals no significant rise in blood level occurs with further doses at the same int rval
5 Cumulative effect Wl n a fixed dose of quinidine is giv n

4 tim s a day as in a maint nance dose sch dule th blood l vel ris s p og ssively but mo slowly re ching a maximum in h ut 48 to 72 hours Th m d d y bl od l els then main more o less th sam a long a this sam dose hedul is m int ined If high r blood le ls a d sir d th i d vid al dos must b increased or the int rv l b tw n do s shorte d

B use of th f ct that 30 40% of th peak blood level of q in dine i still pr aent in the rum 12 hours following peat d d s s of quinidin a f xed dos ge hedule uch as 0 4 Gm (6 gr) every 2 h r for 5 dos s an be rep ted for se l d ys to prod ce incr asing concentrations of quinidine in the blood

U e

W dely diff rent opinion ha been xp ss d by vario s ca di l gists on the indicat on dosages and dang rs of th u of q inid It must be memb r d th t p ti nts in whom quinidin ha b e u d h ve organ card ac dise se unp dictable accid t oc ur ven wh n quinid n i not gi e to th se individu ls Until recently no sat f ctory method f blood quinidine d te min tio has b en a ail ble therapy th for w s ften on an arb trary the than a quantit tiv b s

A Ind tion

1. Vent ic lar t hyc di
2. C ion f a ri ular f brillatio to nu hythm Most c diol gists fe l th t the p e nce f mark d cardiac f il ure se i s organic h art d se s and a tiv rheum ti f v r contr indi te th u e of quin din
3. A i lar flutt r if dig t l s f ils to p du sinus rhythm
4. Paroxysm l uricul and nodal ta hyca dia
5. P ev nti n of r cur t paroxysm l arrhythmias
6. upp sion of f qu nt prematur be ts sp ially following myoc d al infa ction p top tiv st t s tc

B Co t i d tion

1. Idi ync a y as manife t d by f ve purpura rash s v r hypot n ion f llowing th t st d se of 0 1 Gm
2. C mpl t h a t block } R lativ
3. Bundi branch block } contraindic ti
4. Thyroto i osis
5. A ut heumati fe r
6. S b cut b cte i l e do d tis

Rout s of Admi i t sti

A Oral (Quinid S lf t) This i the meth d of hol pt wh n pa t l quin dine i sp if lly indicated

B P t l

1. Int amuscula p ep ations Th int am ular p par tions an be us d if the p ti nt i unabl to take th m dica tion o lly and the itu tion is not critical
   a. Quinidin gl on t 0 8 Gm (12 gr) in 10 cc ampules
   b. 20% quinidin s lf t in p opyle gly ol
   c. 15% quinidin hyd ochlorid di olved in ur and antipyrine
2. Int venous p pa tion An int ou p ep ation should

be used only when great urgency requires it and by a physician familiar with the use of the drug Quinidine gluconate 0 8 Gm (12 gr) in 10 cc ampules can be diluted with 50 100 cc 5% glucose and given slowly I V at 1 cc per minute

Toxicity

A Idiosyncrasy (see page 201)

B Toxi Effe t

1 *The myocardial toxicity is the most important and should be specifically looked for when quinidine is used The earliest effects are seen electrocardiographically*
   a Prolongation of the QT interval
   b *Prolongation of the QRS interval*
   c Ventricular premature beats or ventricular tachycardia

2 *Nausea vomiting, and diarrhea These are rarely critical* but may be sufficiently severe to require cessation of the drug

3 Cinchonism Tinnitus vertigo and headache are usually mild but may be *important enough to require stopping the* drug

Caution When the QRS interval becomes more than 50% wider than that seen before treatment or when runs of ventricular premature beats or ventricular tachycardia occur quinidine should be immediately stopped In patients with auricular fibrillation who are converted with quinidine transient S A block may occur at the time of conversion and nodal rhythm may be temporarily noted This has not proved to be of clinical significance In very rare instances ventricular tachycardia may progress to ventricular fibrillation a d sudden death Prolongation of the PR interval is occasionally seen for a short time when sinus rhythm follows quinidine conversion of auricular fibrillation This rarely is serious and usually subsides spo taneously as the smaller maintenance doses of quinidine are employed

4 Other cardiovascular effects
   a Hypotension may occur when large doses of quinidine are used or if the drug is given parenterally It rarely is significant with ordinary oral doses
   b Embolic phenomena Emboli occur in approximately 1% of patients with chronic *auricular fibrillation conv rted* with quinidine The incidence is higher in untreated *auricular fibrillation in fact auricular fibrillation* with frequent emboli is an important reason to attempt con*version to sinus rhythm Anticoagulants are advised for* 1 2 weeks prior to con ersion in these cases to prevent *the d velopment* of new thrombi in the auricl s The hazard of emboli with quinidine has been exaggerated but *must be appreciated and regarded as a calculat d risk*

Procedur for Conversion of an Arrhythmia to Sinus Rhythm

A The patient should be under const nt ob ervation preferably in the hospital where frequent examination apic l cardiac rates and *electrocardiograms may b taken*

B A test dose of 0 1 Gm (1½ gr) has been traditionally used to exclude possible idiosyncrasies Wait 2 hours

C If the patient has auricular fib illation o auri ular flutter compl t dig tali ation is advised to slow th ventr cular rat and to impro e ardi c fun tion If d git lis is not used th d r as d A V conduction r sulting from q inidin may ause a ise in entr cular rate of 30 50 be t per minute and may f rce ce s tion of q nidine th rapy

D If cardiac failure is pres nt in a patient with chronic a rhyth mia wh re immediate conv rsion is not e s ntial additional m sures (sodium r tri t on m rcurial di retics etc) should be u ed pri r to quinidine th r py A period of omplete ambulatory status f llowing the treatm nt of card ac failure is also advi able to d cr ase th likelihood of venous thrombosis A ti oagulants m y be d sirable for a week prior to quinidine

E A satisfa t y method of quinidine administration is as foll ws 0 4 Gm (6 gr) ev ry 2 hours fo 5 6 dose on the first d y Thi produ e an average blood level of 6 7 mg /L Ea h succe ding d s produ es a p og e si ly sm lle incr ment in th blood l vel and if con er ion does n t o cur aft 5 6 d es a higher dose of the drug must be institut d If the ituatio is urg nt this may be started after th fifth do e or one can wait until the next m rning and tart th dose with 0 6 Gm (9 g) very 2 hours Giving th drug m r fr qu ntly than every 2 hours do not permit the pe k effe t of the pre eding d e to be each d In th m j rity of c s s 0 6 Gm (9 gr) e ry 2 hour for 5 d se will con ert the arrhythmia to l us rhythm If not highe doses can b used if no toxicity ha been encount r d and it is u g nt to onvert the arrhythmia Eighty pe nt of the s c essful conve sion occur w th daily do es of 3 0 Gm (45 gr) or l s If d se gr at r than this are us d succ s ful conv r i n will b less likely and toxicity g eate In ddi i n t seri l blo d qui dine l vels the effect of q inidin can be quantitated by

1 D te mining th ate of th f b illation wav s best btai ed by V_1 th ight pre o dial lead in the l ctro ardiog ams The auricular r t is slowed mark dly in auricular fibrilla tion as the rat approach s 200 250/min conv sion is ne

2 M asurem nt of the Q T interval and QRS compl x As th se me u em nts incr se up to 25 30% of control m su em t significant qu inidine eff cts can be p edict d

NITRITES

The nit it s a t by r l xing the smooth muscle especially of the o on ry art ri s and l o of the other sm ll r blood ves ls using a f ll in blood p sur The r pid ting nitrite ar s l l in angina pe toris slow acting drugs m y benefit a f w l t d s of hyp rt nsion and may oc a ionally be of u in p tients with f equent bouts of angina

Preparations and Dose	How Administered	Speed of Action and Duration
Amyl Nitrite U S P B P Pearl contains 0 2 cc (3 ♏)	Break pearl in cloth inhale p r n	Onset 10 sec Lasts 5 10 min
Glyceryl Trinitrate Tablets U S P B P (Nitroglycerin) 0 3 0 6 mg (1/200 1/100 gr)	1 tablet placed under tongue p r n	Onset 1 2 min Lasts 15 40 min
Pentaerythritol Tetranitrate N N R *(Peritrate®)* as powder or 10 mg (1/6 gr) tablets	Orally every 4 6 hours	Onset 15 30 min Lasts 4 6 hours
Sodium Nitrite U S P B P 30 60 mg (1/2 1 gr)	Orally every 3 4 hours	Onset 5 10 min Lasts 1 2 hours
Erythritil Tetranitrate U S P 15 30 60 mg (1/4 1/2 1 gr)	Orally every 4 6 hours	Onset 15 20 min Lasts 3 hours
Mannitol Hexanitrate Tablets U S P 15 60 mg (1/4 1 gr)	Orally every 4 6 hours	Onset 15 30 min Lasts 4 6 hours

XANTHINES

Recent studies with cardiac catheterization and metabolic balance studies have demonstrated that intravenous xanthines increase the cardiac output increase renal blood flow and glomerular filtration rate and enhance the excretion of sodium and water they therefore may be valuable in the treatment of cardiac failure In addition they have been shown to increase the coronary blood flow when used in large doses and may on occasion be helpful in angina pectoris

Preparations

A Oral. A variety of official preparations are available but a satisfactory one is Aminophylline U S P B P (enteric coated) 0 1 0 2 Gm (1 1/2 3 gr) 4 6 times per day

B Parenteral Aminophylline Injection U S P B P 0 25 0 5 Gm (3 3/4 7 1/2 gr) I V slowly over a 5 minute period or I M may repeat in 2 4 hours

C Rectal suppositories containing aminophylline 0 36 0 5 Gm (5 7 1/2 gr) may be valuable in impending attack of cardiac asthma or in nocturnal angina pectoris

MERCURIAL DIURETICS

The mercurial diuretics act by reducing the tubular reabsorption of sodium and chloride Th y may be us d for edema due to most causes except those associated with impaired renal function They are of great importance in congestive failure Avoid excessive use especially if the patient is on a low sodium diet since

these ag t may se dium d pl tio or hypo hloremi alkalo sis (ee page 187)

Parente 1 P pa ti ns

1. M curophylline Injection U S P (M rcu anthin®) 1 2 cc I V eded
2. M s lyl and Theophylli e Inj ct on U S P Inj ct on of Mer alyl B P (S lyrgan Theophyllin ®) 1 2 c I V as d d
3. Merallu id Injection U S P (M rcuhyd in®) 1 2 c I V r I M a d d
4. M capt m n Sodium N N R (Th ome in Sod um®) s p pl d s dry powd r in vial 1 4 Gm (21 gr) in 10 c vial 4 2 Gm (63 gr) in 30 vial Add d stilled w t r to bri g to p ope v lum and ref ig rat Gi e 0 5 to 2 0 subcut as ed d M y lso use I M

Or l P pa tions

Although th o l pr paration ar not fully e alu t d and may b e ati in th ir action th ir us may at tim b w rranted Se eral ar r tly a liable

1. Mercuhyd in® w th Ascorb c Acid 1 2 tabl t aft r very me l
2. Chlormerod in N N R (Neohydrin®) 18 3 mg (10 mg Hg) 1 tabl t or more daily as n ed d

OTHER DIURETICS

The e a e of le s value th th m urials

1. Ammonium chloride 4 8 Gm (60 90 gr) d ily for 3 4 days f ll w d by t p iod f similar durat on Useful also as a p te tiating agent f th a tion f m curi l
2. Carbonic anhydrase inhibitors Va ious p eparati ns u h as sulfanilamid and Diam x® ha e b en empl yed but their us fuln s ha not be n fully d t min d

PROCAINE AMIDE HYDROCHLORIDE N N R (PRONESTYL®)

P aine amid d p s a ctopi p m k s pr nts rrhythmias und r ey lop op n e th i f ll wing pin phrin and is us ful in th t tm t of nod l and v nt i ular a hythmias To l s r deg it an be u ed to p e t the e arrhythmias Its ff ct on th auri ular a hythmias l mu h l s potent than i eff t on th v tricular arrhythmias Clinical xperi ce is still too lim t d t tate wheth r p oc ine amid or qui idin i th dr g of choic in the ve tric l r ar hythmi s

D g and Administ tion

A. Or l P p t on (250 mg p l) 250 mg to 1 Gm (4 15 gr) o ally e ry 4 6 hour i th recommended dose

B. I t m ul P par tion (1 Gm ampul l 10 c dil t) The pe k eff t oc ur within 15 60 minutes and a signifi ant blood l vel is still p nt aft r 6 hours The blood l v l i

higher and the decrease is slower in patients with congestive failure and renal insufficiency Hypotension is infrequent with the intramuscular use of the drug in the above dosage

C Intravenous Preparation (1 Gm ampules in 10 cc diluent) Can be used for ventricular tachycardia of a severe or urgent nature The drug should be given very slowly 50 100 mg (3/4 1½ gr) per minute up to a dose of 1 Gm (15 gr) with continuous blood pressure and if possible electrocardiographic control

Toxicity

The same precautionary methods outlined in the sections dealing with quinidine are essential when procaine amide is being used

A Severe Hypot nsion This is noted particularly with the parenteral u e of procaine amide and may be severe enough to require cessation of the drug This is why freq ent blood pressure demonstrations are necessary while the drug is being given

B Condu tion D fects, Prolongation of the QRS interval may occur as with quinidine

C Ventricular arrhythmias may occur as with quinidine

Chapter 8

DISEASES OF THE BLOOD VESSELS

PERIPHERAL ARTERIAL DISEASE

An important consid t on in th m gem t of pat t with periph l rte ial d se i th det mi t on f (1) th amo t of d b l ty du to sp sm and (2) th mount of dis bility d to c l ion The apy is a med in each se t li ng th d turbances

Differential Diagnosis of Common Peripheral Vascular Diseases

	R yn ud D s e (ode No 47x 50)	Th mb ang it Obl t s (od N 402 930)	A t i cle os s Oblit (ode No 460 952)
Sex	70 90% f male	97% mal	Ov 75% m le
Ag t t	10 50 y s	20 35 y	O 50 y
Ext m ti s in l ed	Us ally pp b t may o i low r	40% pp 98% low	Alw y l w ar ly ppe
Symm t y	Symm t al bil t l	A ymm t l u lly b l t l	A ymm t al su lly bil t l
P iph l a t l p l ti s	P es t	Ab nt o dimi h d	Ab nt d m h d
L u l tes of g gr	Sm ll as at t ps of fing rs and t	V ri bl	V iabl
V nous n vol em nt (phl biti)	Ab t	Oft pr t	Ab e t
C l ifi tion in te i	Ab nt	R	Us ally p e t

Degrees of Spasm and Occlusion in Peripheral Vascular Diseases

D s	Sp m	O l ion
A t i l is oblit	0 to	+++
Th omboang tis bl t ans (B g s di)	+	++
R yn d d	++	0 to
A t a t i l mbol m	++	++

Differentiation of Spasm and Occlusion

	Spasm	*Occlusion*
Color	Livid cyanosis	Blanched
Moisture	Wet	Dry
Veins	Constricted	Full dilated
Temperature	Cold	Cold
Reaction to vasodilating tests	Extremity becomes warm	Extremity remains cold

Adequate *differentiation can usually be made on the basis of the* first 3 of the above factors Peripheral arterial disease usually is a mixture of spasm and occlusion but in many cases one factor is more prominent than the otl er Therapy is aimed at correcting the physiological abnormalities whenever possible

Test for Degree of Arteri 1 Occlusion

A simple technic for ev luating the degree of arterial occlusion in the lower extremities especially the foot is the reactive hyper *emia and elevation test The test is particularly useful in evaluating* treatment and in determining the prognosis of ulcers of the foot

A Te hnic
 1 The patient is placed supine and the brachial blood pressure taken
 2 The toes are raised to 65 cm above the auricular level and observed for blanching [The auricular level is taken at 7 cm below the junction of the manubrium and the body of the stern m (Angle of Louis)]
 3 If no blanching occurs the feet remain elevated and blood pressure cuffs are inflated just above the ankles to a pres sure 50 cm above brachial systolic pressure The occlusive cuffs are left on for 5 minutes
 4 At the end of that time with the feet still elevated the pres sure in the cuffs is suddenly released and the feet obser ed for return of color
 5 If at the end of 1 minute color has not returned the foot is lowered 5 cm and then lowered 5 cm every 30 seconds un til color returns The level at which olor returns is noted

B Interpretation
 1 If the filling pressure (level at which color returns) is 35 cm or more above the auricle spontaneous healing of an ulcer will occur or if amputation is necessary through the foot the amputation site will heal
 2 If the filling pressure is under 35 cm the more extensive procedures (e g sympathectomy endarterectomy) or drug therapy must be done to help raise the pressure

CHRONIC OCCLUSIVE ARTERIAL DISEASE
(Usually Arteriosclerosis)

Tre tment

Primarily conservative but thrombo endarter ctomy vascular grafts and sympathectomy are of inestimable value in the prop rly selected case

A Ge e 1 M s res
1 C ct any dis d (g ong stive failure) which may interfere with the blood supply
2 Diabete if p esent must be vigorou ly controlled
3 T b cco in any f rm hould probably be p hib ted but there is no complete agreem t on thi p int e pt in thrombo ang t s obl terans or Buerge di e s where treatm nt is useless in the patie t who contin es to smoke
4 Al oh li be e g s in mod tion are not co traindic ted
5 A w ll b lan ed nut t ous di t should be maint ined
6 Adequate rest and relaxatio avoid fatigue

B Loc 1 M
1 A oid extr mes of h t and cold do not us ontr st b ths
2 Fungou infectio s of the f et must be cont olled Castell ni s dye i p efe red by many avo d using Wh tf ld s tm t (e page 90)
3 Infect o s of and t uma to the aff cted tremity must be guard d gain t Th p ti nt hould be g v n the following in t ctions
a So k feet for 10 15 mi ute in warm water (*not hot water*) b f re cutting il
b Bunions r co s mu t be t immed by a phy ian or a hiropod st
c Skin mu t b k pt oft and pliant by ubbing with lanolin a bland getabl il 1 2 tim daily
d Socks hould be hanged t least on e a day F r wa mth us ft wo l socks 2 p of anothe kind
Shoes m st b w ll fitt d and ha no pre sure point

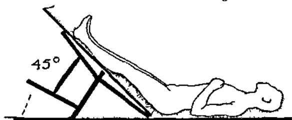
C Spe i 1 M es The following m y be us d in an ttempt to in r as ollate al c ulation
1 Bue g r exer ises m y be of valu Howev do not use if an infection op wound is pr e t Individ lize th ex i es f r e h p ti t D m nstr t n and reh ar al a of g t imp tance
a Ele te l g about 45 degrees (upport th m on inv rted chai o th wall) unt l blan hing o pain ccu (s ally in 1 2 minut or l s)
b Ne t llow the l g to dangl fre ly for 2 5 min tes until maximal rubor c At the same tim th fe t ar mov d downw d and upw rd and th inward and outward Th toe ar sp e d and cl ed while these mov ment are bei g mad D ea h e i of foot er i es 10 tim If the f t ar too painful it m y be nec sary t lumin te th e ercises
Th pl c legs and body in a h rizo t l position f 2 minut s
d R pe t thi compl te outin 5 times t e h s sio and have 3 5 essi daily
2 M chani al devi es m y be ed b t it is pr b bl that the only ff cti e device is the oscillati g bed
3 V odil tor drug (e *page 212*) Th s ar usually of little o no l and, unles th e t abnormal v so on t iction m y ct lly be h mful Blood flow studi s show a d c ease in th blood upply to the isch mic limbs f th eld rly ar t riosel otic t th height of yst mi vasodilat tion d e to drugs

D *Treatment of the Severe Stages of Periph ral Art rial Decompens tion*
1 Treatment of claudication
a Teach patient to walk slowly take short steps and to stop to rest before the pain of claudication is fully developed
b Correct any ligamentous or arthritic disabilities stretching exercises salicylates
2 Treatment of rest pain
a Have patient sleep with the head of his bed elevated 8 10 inches
b Limit activities rigidly
c If edema has developed an oscillating bed or B erger s exercises may be prescribed
3 Treatment of severe infection or incipient gangrene
a Start antibiotics as soon as infection occurs (see page 514)
b Keep extremity horizontal or lowered ne er elevated The oscillating bed may be useful
c Keep the foot free of dressings
d Room temperature must be comfortable (70° 80° F)
e Support bed clothes by use of a cradle over affected limb or by a pillow under bedclothes at the foot of the bed
f Drain purulent pockets thoroughly but gently This may be accomplished by covering crusted lesion with a few layers of Vaseline® or Xeroform® gauze for 24 hours then applying saline sponges at room temperature and changing frequently during the next 48 hours Then dress the lesion with a bacitracin or bacitracin neomycin ointment and a single layer of Xeroform® gauze for 2 3 days Reinstitute this treatment when n cessary

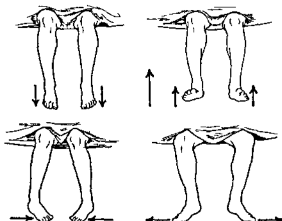
E Surgical Measures
1 Thrombo endarterectomy This procedure is especially useful in the segmental or localized occlusion of major arteries
2 Sympathectomy If there is some evidence of abnormally increased vasomotor tone (see page 208)
3 Conservative amputation (toe or transmetatarsal) When reactive hyperemia and elevation test shows a filling pressure in the small blood vessels of 35 cm or more (see page 208)
4 Classical supracondylar amputation If filling pressure in small blood vessels by reactive hyperemia test is l ss than 35 cm and thrombo endarterectomy or sympathectomy *is* not indicated

VASCULAR SPASM

Tr atment
A Ge ral Measures The same as for occlusive disease However *tobacco in any form must be strictly prohibited*
B *Local Measures* *The same as for occlusive disease* especially if associated occlusion is present
C Measures aimed at prolonged or permanent relief of spasm
1 Surgery Sympathectomy of the affected extremity is usually



First position Elevate feet until thoroughly blanched may take 1 to 2 minutes or less



Second position Keep legs depend nt until maximal color returns (may take 2 to 5 minutes) Do each series of foot exercises 10 times



Third position Horizo tal 2 minutes

the treatment of choice

a Criteria for sympathectomy Best determined on clinical grounds assisted by vasodilator tests
 (1) Clinical evidence of increased vasomotor tone This is evidenced by sweating cyanosis and constricted veins (absence of severe rubor and normal or slow blanching reaction on elevation)
 (2) Sympathetic block or similar test gives relief of pain, better color to feet and relief of intermittent claudication

b *Contraindications* Poor venous tone
 (1) Marked rubor on dependency
 (2) Rapid blanching on elevation
 (3) Atrophy of tissues

2 *Vasodilator drugs*

a Chemical sympathectomy The introduction of ganglionic blocking agents has afforded a new approach to the relief of abnormal vasoconstriction Many have been tried but *only a few are useful*

(1) *Adrenergic blocking agents These drugs act at the nerve endings in the vascular muscle cells (neuroeffector site) which is probably the most desirable mode of action They thus not only block the sympathetic vasoconstrictor stimuli but also the vasoconstrictor effects from circulating epinephrine and norepinephrine* This group of drugs includes Benzazoline (Priscoline®) *Phenoxybenzamine* (Dibenzyline®) and Dibenzazepine (Ilidar®) *(see table)* These drugs are effective orally At present they are the most useful in counteracting abnormal vasospasm

Side effects which are troublesome but not serious may be nasal congestion miosis prickly sensation of scalp Weakness dizziness and fatigue which are related to a moderate postural hypotension this may be corrected by a decrease in dosage Overdosage may result in a more profound postural hypotension with faintness or syncope These drugs should be used with caution in any patient who gives a history of asthma or peptic ulcer They may be given intravenously or *intra arterially but these routes are* rarely necessary

Drug	How Supplied	Dosage
Benzazoline (*Priscoline®*)	25 mg *tablets*	*Start with* ½ tablet t i d and gradually increase to 4 8 tablets daily
Phenoxybenzamine (*Dibenzyline®*)	10 mg capsules	Start with 2 capsul s daily and increase by 1 every 4 days up to 4 6 capsules daily
D benzazepine (Ilidar®)	25 mg tablets	Start with 1 tablet t i d fo 1 week then 2 tablets t i d for the 2nd week then may increase to a maximum of 2 tabl ts q i d

(2) Ve atrum virid compounds Produce peripheral vaso dil tation by d pressing vasomotor c nt rs in th hind b ain They do not block vaso onstricting effects from irculating epinephrin and no epinephrin They are relatively in ffective in a pati nt with vascular paam

(3) T tr ethylammon um ion and meth nium compounds Blo k ympathetic and para ympath ti impulses at ganglionic synaps Th y do not block v so onst i t ing effe t fr m pinephrine and n r pinephrine and m y pote tiate vas constri ting re ponses to epin ph rine and norepinephrine

b Dir ct v sodilator (a t dir ctly on va cular mus le) Nitrit s nicotinic acid and d rivativ hav not proved to su c s ful in pati nt with abno mal v soconstriction

ACUTE ARTERIAL OCCLUSION
(Acute Arterial Embolism code No 46 618)

Acut rte ial occlusion i u ually due to emb li m It o curs mo t ommonly in patients with auricular fibrillation or myocardial infarcti n but may result f om th ombosis of v sel esp cially during peri ds of hypotension

The ons t is frequently udd n and a sociat d with se r p in Constitutional symptoms and hock are prese t if the rt ry is of large caliber The is puls lessnes of the dist l art ry and p l- lor and coldn ss of th extremity with numbn s tingling and mus l pare is If treatment is not instituted the xt emity o part m y unde go gangrenous chang

Treatm t

A S rgi al Imm di t emb l ct my i th tre tm nt of choice

B G n l Meas r s To ombat the thrombotic exte sion of the mb lus ar d efl x v so pasm in t tute the following m s re t once and continu postope ativ ly (r use if urg al tr t me t is not pos ible)

1 M rphin lfat 10 15 mg (1/6 1/4 gr) I V at on e and pe t as n d d sub utaneou ly

2 Anticoagulant th apy should be institut d at once t p v nt thromboti xte ion of th mbolus Giv H pa in Sod um U S P B P 2 cc (20 mg) (2000 units) I V immediat ly The effects of this h pa in will usu lly h v w rn off by the time th patient ha been transpo t d to a hospital or p pa d f oper ti e t e tment The us l gimen of nti c gul nt therapy is the st rt d a soon s possibl (e p g 216)

3 Proc in o xylocaine block of the ymp theti s to th af f ct d extr mity m y be h lpful Repe t a n c s ry b t us cautiou ly in th p ti nt who ha r ceived anticoagulant th r py

4 Vasodilat rs and sedativ s

a Papave ine Hydrochlorid U S P B P 30 60 mg (1/2 1 gr) I V e ry 2 3 hour

b Ethyl al ohol (as al oholic bev rage) o ally in g e ou amounts

c Adrenergic blocking agents (See page 212)
5 Oscillating bed Useful in acute occlusions

C Local Measures
1 Keep extremity horizontal or slightly depressed if an oscil lating bed is not available protect against pressure or trauma
2 Avoid use of heat or cold to the affected part

D *Treatment of Isch mic Neuritis* May follow acute arterial occlusion
1 Vitamin B_{12} (Cyanocobalomin N N R) 1000 mcg hypo dermically daily for 2 weeks has been advocated
2 Arteriectomy will give relief if Vitamin B_{12} therapy does not help but reestablishment of circulation by thrombo endarterectomy is preferred

DISEASES OF THE AORTA

AORTIC ANEURYSM
(Syphilitic code No 461 147 6)
(Arteriosclerotic code No 461 942 6)

A true aneurysm is a pulsating sac which forms as the result of dilatation of the wall of an artery Those in the proximal part of the aorta especially the arch are most frequently luetic Those farther distal are commonly arteriosclerotic

The signs and symptoms vary with the location and size of the aneurysm Most frequently they are due to local pressure less frequently to rupture The most common symptom is pain which results from pressure on surrounding structures Pressure on structures about the aortic arch also frequently causes dyspnea and cough Abdominal aortic aneurysm may produce back flank or groin pain Some aneurysms may be asymptomatic and may be discovered by physical examination or by x ray of chest or abdomen

Treatment

A Specific Measures Treat underlying syphilis if present (see page 440)

B Surgical
1 Replacement of the weakened wall by an autogenous vein-inlay graft homologous arterial graft or Vinyon® or Orlon® cloth prosthesis is the preferred operative tr atment
2 Palliative Attempts to halt further dilatation by producing an internal thrombus along the walls of the sac or by xter nal connective tissue formation are palliative procedures to be used only in the poor risk patient

DISSECTING ANEURYSM OF AORTA (code No 461 940 1)

Dissecting aneurysm is caused by the rupture of the intima and forceful separation of the coats of the aorta in the presence of hypertension It is usually secondary to arteriosclerotic changes the aorta

It i man f sted by udd n onset of sev r agonizing pain usually in o nea the site of the rupture The pain may radiat to the h ad back pelv s legs Shock follows rapidly and de th usually occu s in a few hou s o days D gnosis i usually mad at utopsy becaus of the clini l similarity to myo rd al infar ti n and a t arte ial cclu ion

T atm nt

Tr atm nt is entirely symptom tic and similar to that of myo cardial inf rction (s page 165)

DISEASES OF THE VEINS

VENOUS THROMBOSIS (code No 48 619)
THROMBOPHLEBITIS (code No 48 100 7)

A dit on of unc tain tiol gy in which a thrombus f rms in m ll ein (sually the l we part of th leg) a d grows by d p si tion of f brin and ll f lling the la g r v ins of th leg (98% f c s s) Inflamm tion of a localized a a or much of the vein m y b p e nt Early in the disea th chi f dang r li s in th d t hme t of all part f th thrombu p odu ing pulmonary in farction Years later the hief dang r li s in th developm nt of th po t phl bitic l g with edem sub utan ous fib o and l r tion

This condition is common in both medical a d rgical p ti nt The pr s nt medical and surgical treatment m thods may possibly be of v lu b t leave much to b d sired

Diagn i

Early di g is and imm diat therapy is f utmost importance t pr e t pulmonary infarction

A Hi tory Venous thrombosis t nd to ccu aft r abdomin l or pel i g y tr um prolong d bed rest and in m lignan ie
  1 Pain in calf and b hind knee are important and e ly symp t m
  2 Pleuritic p in f s dd n on t with bloody sputum is highly sugg stive of p lm ary infarction

B Physi l E amination M y be negative
  1 Earli t gns
    a Diff h in color of fe t with elevation
    b Slight diff r n e in temperature
    c Dil t tion of superfici l veins of leg
  2 Pain or t nd rne on palp tion ove m in venous chann ls of alf foot *Do not palpate too vigorously*
  3 Homans sign Limitation of motion on active dor iflexion f foot
  4 Sw lling of the lf U ually late ign May be det r min d only by measu em nt and omparison with the oppo-it limb o by repe t d m urem nts
  5 E mination of the ch st in cas s of uspect d p lmonary infarction may eveal an a ea of diminished b th sound c pitant rales o a pleural f iction rub

Treatment.

A. Anticoagulant Therapy As soon as the diagnosis of venous thrombosis is made anticoagulant therapy must be started at once *Prothrombin level and Lee-White clotting time must be determined first*

1 *Heparin*

a Intravenous (intermittent) administration *If clotting time* is normal (5 10 min) give 5 7½ cc (50 75 mg) *of* Heparin Sodium Injection (Dilute) U S P Injection of Heparin B P *every 3 4 hours I V An ideal heparin* response is one in which the clotting time is increased to 30 60 minutes and returns to normal in 4 hours At least for the first few doses test the clotting time before giving the succeeding dose If the clotting time exceeds 15 min defer the next dose until it falls below this level *After checking the clotting time several times it is usually* possible to establish a dosage which can be used at 3 to 4 hour intervals It is important not to go too long without adequate therapeutic levels and it is likewise important not to give the next dose when the clotting time is too prolonged

b Subcutaneous Prolonged anticoagulant action of heparin may be obtained by the deposition of a highly concentrated *solution of crystalline heparin into a relatively compact and avascular area the subcutaneous fat One injection* daily appears to give a prolonged anticoagulant action A highly concentrated aqueous heparin (200 mg per cc) is injected slowly through a No 25 needle into the s bcutaneous fat 1 2 inches below the posterior iliac crest

Average doses are

100 lb patient	200 mg daily
150 lb patient	*250 mg daily*
175 200 lb patient	*250 300 mg daily*

Check *Lee* White clotting time before starting treatment and just before the next dose Modify dosage as necessary (See previous section)

At present the most general use of heparin is during the first stage or from the first to the *third days of anticoagu* lant therapy until the oral prothrombin *depressants become effective The subcutaneous administration of heparin may be used alone without* the addition of prothrombin d pressants

2 Prothrombin depressants During the first stage of treatment (1 3 days) it is best to supplement these drugs with heparin until prothrombin concentration reaches therap utic levels (10 30%) Prothrombin levels should be done every day and the next dose not given until the day *s level is* known

a *Bishydroxycoumarin* U S P (Dicumarol®) Usually takes 48 72 hours to reach effective therapeutic levels and the same time to return to normal after discontinuing treatment Initial dose is 200 300 mg on th first day 100 200 mg on the second day Maintenance dose varies from 25 to 150 mg daily

b Ethyl Biscoumacetate N N R *(Tromexan®) Tromexan® is said to induce a more* rapid fall in prothrombin

on ent ation and a m e rapid rise after cessation f oral administration than Dicumarol® Initial dose is 1500 1800 mg in 2 divided do es on the first day and 300 600 mg on the econd day Maintenance do e is 300 900 mg daily in divid d doses H parin is usually only giv n f the first 24 hours because of the m e r pid ction f Tr mexan®

c Phenindione (Ind n® Hedulin® or Danilone®) Has th d antage of r pid na t and cessation f action to a d g e c mp able with T om x n® Initial dose is 200 400 mg in 2 divided doses Maint an e dose is 50 150 mg in divid d do s Vitamin K is apparently not ef fecti e in ounte acting the eff t of ph nindione but this m y n t b important in view of the rapid et n to no mal p th ombin l is afte topping th dminist tion of the drug

3 Duration of th apy Th duration of anticoagulant therapy va ies with e h se For mo t pati t thi is about 10 14 days C ntinu the th py fo about 7 day aft r th r is no furth r f ve o pa n

4 Tr tm nt of bleeding and overd g The p incip l dang f om anticoagulant the apy is bn mal bleeding

a Bleeding d e to ex s h pa in Dis ntinuing th the py will u ually b i g a atio f bl d g i bout 1 3 hour If imm di t tion i ne e y slow I V inj tion of protamine ulfate 40 50 mg will n utr li e th ff t f 5 c (50 mg) of h parin

b Bl ding du to x ess bishydroxy oumarin (Di umarol®) or T om an® This i mor diffic lt t ontrol fo th p oth ombi lev l rises lowly afte th py i discon tinu d Th is is m e ap d wh n T m an® r ph nind on has be n employed

(1) Sev e bl eding

(a) Stop the drug and d not ae g in

(b) F esh blood (cit at d) t ansf ion imm di t ly

(c) Vitamin K_1 em l ion (M phyt n®) 100 200 mg I V sl wly (t r t not o 10 mg /mi te by syringe o add d to ve ocly is of d xtrose d/ s lin) and p t v y 6 hour as nec ssa y This is t t d to be mo ff tive than yoth ti vit min K like p odu t (m n dione below)

(d) M nadion Sodium Bi ulfit U S P Giv 50 100 mg I V immediately and epe t 2 3 tim the first d y

(2) Mild bleeding

(a) Stop d ug st rt at low d g ft p o thrombin tim ris s t 20 30%

(b) Vitamin K_1 (Mephyton®) 50 mg I V above

( ) Men dione Sodi m Bi lfit U S P Inj ction f Menaphthon B P Gi 50 100 mg I V im mediately and pe t 2 3 tim th first d y

Overdosag f bi hydr ycoumarin (Di uma ol®) o Tromexan® with ut bleeding If th prothrombin l d op below 10% and doe ot is in 2 days aft tinuing bi hydroxy oum in T om xan® give 50

of Mephyton® I V or 20 50 mg of menadione I V When prothrombin rises bishydroxycoumarin or Tromexan® may again be given

B Vein Ligation

1 If anticoagulant therapy is contraindicated Vein ligation is recommended for any case in which anticoagulant therapy is contraindicated These are cases with purpura open ulcers presence of drainage tubes certain cases of renal or hepatic disease and in cases preparing for C N S surgery

2 Active thrombus or embolus formation Vein ligation should be performed if there are signs of propagation of the throm bus if emboli continue to occur while under anticoagulant therapy or if septic phlebitis is present

C General Measures

1 The patient rests in bed with the foot elevated 4 6 inches

2 An elastic bandage is applied snugly from the foot to above the knee or mid thigh to keep the veins collapsed Do not obstruct arterial circulation Check the pulses Rewrap every 6 hours

3 Exercise As soon as treatment is started allow free move ment and exercises in bed (see below) If leg is in cast pa tient may exercise by tensing and relaxing muscles in cast

4 Ambulation As soon as the acute pain subsides (or if no pain is pres nt as soon as therapy is instituted) the patient must be made ambulatory (unless other systemic conditions prevent this) During this time an elastic bandage should be worn The time out of bed and walking is increased every day The elastic bandage should be worn for about 3 weeks after full ambulation has been achieved

Prophylaxis

A Early Ambulation and Exercises

1 Early ambulation Prolonged bed rest or inactivity should be avoided especially in elderly patients Have patient up and about as soon as possible after operation or acute illness Walking a few steps is preferable to sitting for half an hour or more in a chair

2 Bed exercises If bed rest is necessary passive or active bed exercises should be institut d as soon as possible and should be continued as long as patient must remain in bed These consist of active or passive flexion of toes ankles knee and hips repeated 5 10 times every hour while awake

3 Movement in bed With patients at bed rest keep bedclothes loose so patient can move legs freely

4 Elevation and compression Elevation of the foot of the bed 4 6 inches and wrapping legs from the toes to just below the knees with ace bandages will generally promote venous re turn

B R utine Prophylactic Use of Anti oagulants In elderly patients who cannot pe f rm any of the above regimen these may be of value (give as outlined on page 216) but in general the routine prophylactic us of anticoagul nts is not advised

Chapter 9

DISEASES OF THE BI OOD AND LYMPHATIC SYSTEMS

ANEMIAS

HYPOCHROMIC ANEMIA (code No 501 736) (Normocytic and Microcytic)

Hypoch omi anemia (low olo ind x and M C H f less than 27 γγ) cl d anemi s d e t nut itional d f ie e inf ct ns and to ins and chroni blood loss Wom n quir about 4 tim s a much i on a m up t th m nop s

P th g is

A Chroni blood l ss
B Inadeq ate int k f iron (n triti al an mi)
C D f ct v bs rpti n f iron in the g st ointestinal tract (e g hypo h omi mia of inf tion) Fa to s influen ing abs rp tion of i on in l d the foll wing
   1 Asco bic ac d f il t te th b ption f iron hyd chl ric acid does ot
   2 Depl ti of body i on incr a s th ab o pti n f iron
   3 V l of ir ing sted (Fe^{++} i re d ly abso b d F^{+++} is t)
   4 Infe tion cau d sed abs ption of i on
   5 Pr tein def ien y s a d ased ab ption of i on
D Idiop thic m cha ism
E P g an y

T tm t

A Sp f M
   1 Co t il f to c ng cont ib ting to a mi e g h m h g inf ti d a h omit ng i t stinal p a it m oc it bl ding di ph gm ti h r i g stri p lyps and tumo
   2 I on i p ifi f this type of a mi It i b st giv n imm di t ly ft m la
      a Or l pr p ations d d ag s (Phy i logi l e d is 15 mg /day m ximum ab orption is consid d to be about 100 mg /day)
         (1) F ou S lf te U S P B P 0 2 0 3 Gm (3 5 g) t i d p
         (2) Syrup f F ou Sulfat N F (0 12 Gm or 2 gr pe tsp), 4 8 (1 2 d) b i d o t i d p

SIZE COLOR RELATIONSHIPS OF RED BLOOD CELLS IN THE VARIOUS ANEMIAS

SIZE	COLOR HYPOCHROMIC M C H < 21 γγ C I < 0 9	 NORMOCHROMIC M C H 27 32 γγ C I 0 9 1 1	 HYPERCHROMIC M C H > 30 γγ C I > 1 1
MICROCYTIC M C V < 79 c μ V I < 0 9	Anemias due to faulty GI absorption of iron Iron deficiency anemias Anemias due to infections Anemias due to chemical and physical toxins Splenic anemias Erythroblastic an mias	Uncommon	Uncommon
NORMOCYTIC M C V 80 94 c μ V I 0 9 1 1	Anemias due to blood loss Hemolytic anemias Erythroblastic anemias Myelophthisic anemias	As for hypochromic microcytic and normocytic anemia Aplastic anemias	Uncommon
MACROCYTIC M C V > 95 c μ V I > 1 1	Macrocytic anemias complicated by iron deficiency or blood loss or other of the above factors	As for hyperchromic macrocytic anemias	Pernicious anemia Tropical anemias Anemia of sprue Fish tapeworm anemia Macrocytic anemias associated with Idiopathic steatorrhea Chronic liver disease Gastric carcinoma (rare) Faulty GI absorption Leuk mia ± Pregnancy Infancy.

(3) F rro s Carbonate N F P ll of Iron Carbon te B P 0 5 1 0 Gm (7½ 15 gr) t d p c

(4) Fe i ammonium citr te solution (50%) 4 cc (1 d) t i d p

(5) F rrous Gl conate N F 0 3 Gm (5 gr) t i d p

b Intravenous iron The p t ent may f l to r spond to iron administered or lly b ause of (a) intole ance due to g strointe tinal ir t tion (b) se s t vity to ir n (c) vere ga t ointe tinal dis e co t indi ting ral iron o (d) r f actorin ss to o l ir n (prob bly due t inab l ty to absorb th iron)

I V dminist ation of s char t d iron xide i nd cat d in such s s provid d only th amount n ce sary t cor ect th d f cien y is gi en

(1) C lculation U e of the f llowing formula

(a) (Normal Hgb − p tie t s Hgb) x 0 255 Gm of m tallic iron n ed d

(b) % deficit of Hgb x 25 mg of met llic iron n d d

(2) Admini t ation D not give th tot l dose at one time dminist r s follows

( ) Initial dose 50 mg I V

(b) Subs q nt d ses 100 150 mg I V dail until tot l dose i g n

3 Adj ant th r py

As o bi id Giv a o ang jui or a asco bic id tablets 30 50 mg per day fo child n 100 150 mg per d y for dults

b Hydrochl i Acid D luted U S P (10%) 2 4 c (½ 1 dr) t i d in a gl of wat r with meals ipp d through a gl s or fib tub f equ ntly ha b n p s ibed for p tient w th achlorhydria but r c nt videnc indicates that dilute hyd hlo i a id do not f l t t th b so ption of iron in the gastroint stinal tract If prescrib d p tie t m t brush t th with odium bi b n te aft meals t eutr l acid left on the teeth

B Ge l M ur s

1 D et H gh i lc high p ot in high i on high vitamin di t At least 70 Gm p ot in/d y for averag adult F ods high in iron in lud li or other organ m t f e h red m t yst eggs v getables sp ially egetabl gr n p ach s pricots p un s t A 2240 calo i di t o tain ing 70 Gm prot in 115 Gm f t and 230 Gm a bohydrat will cont in app ximat ly 20 mg of iron

2 Vitamins Vitamin d fi i n ies ar usually mult pl and are ociat d with oth r utritional d fi i n ies M k a car f l surv y f nut itional tatus bef dministe ing expen sive vit min p pa tion whi h a e not indic t d

a Indic tions Vit min d f ci y diseas s directly o in directly s ociat d with an mia includ berib i pell gra urvy and hypop othrombin mia du to itamin K de fici y

b Defi i y di e are mo t oft multipl o it is u ual ly advisable t administ r m lti vitamin p p ations

c Specific prep tions Us only f pecific vitamin

deficiency (see page 58)

3 Whole blood transfusions preferably of fresh blood are *used when there is need for rapid restoration of hemoglobin* this need is more urgent when *hemoglobin is less than 8 Gm* per 100 cc (50%) (see page 247)
   a *Acute hemorrhage when blood loss is greater than 500 cc*
   b Chronic hypochromic anemia when
      (1) *Need for correction of anemia is urgent (e g surgery and acute sepsis)*
      (2) *Fail re to respond to anti an mic measures Re evaluate and consider other causes for the anemia (e g blood dyscrasias and serious constitutional diseases)*

4 Red cell mass (sludge) transfusions are used to restore h moglobin and red cells without
   a Increasing plasma volum
   b Producing or incurring risk of serum reactions (serum jaundice)

5 Thyroid May be indicated if anemia is associated w th frank hypothyroidism or myxedema (see page 368)

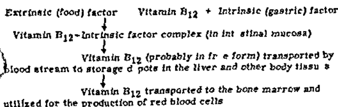
MACROCYTIC ANEMIAS

PERNICIOUS ANEMIA (code No 501 702)

Pernicious anemia (P A) is a chronic and if untreated pro gressive macrocytic anemia The primary defect is the failure of the gastric mucosa to produce a substan e (intrinsic or gastric factor) that is essential for the absorpti n of the vitamin B_{12} in certain foods

In the absence of intrinsic factor in dequate absorption of vitamin B_{12} occurs and a deficiency of this vitamin develops Vita min B_{12} is essential for normal erythropoiesis When deficient *pathologic red cell formation (megaloblastic regeneration) occurs There is no primary deficiency of foli acid in P A The disease responds specifically to the parenteral administration of vitamin* B_{12} *or of extracts of liver containing vitamin* B_{12} *or to the oral admin istration of liver or of preparations containing* intrinsic factor and *vitamin* B_{12}

The relationship of dietary and gastric factors to normal r b c *formation (modification of Castle s the ry) may be outlined as follows*



Extrinsic (food) factor Vitamin B_{12} + *Intrinsic (gastric) factor*

↓

Vitamin B_{12}-*Intrinsic factor complex (in int stinal mucosa)*

↓

Vitamin B_{12} *(probably in fr e form) transported by* blood stream to storage d pots in the liver *and other body tissu s*

↓

Vitamin B_{12} transported to the *bone marrow* and utilized for the production of red blood cells

Diagno is

A Symptoms

1 An mia Weakness dyspnea and palpitation
2 Gastrointe tinal Ano exia diar hea and dyspepsia
3 C N S Numbness and tingling of extremities and sphinct incontin nce

B Sign Pallo icteric tint ta hycardia glossitis mild hep to m g ly and splenom galy diminution of vibr to y sens and taxia

C Labo tory

1 H tamine achlorhydria
2 M crocytic an mia
   a M C V 95 160 μ
   b M C H C > 32 36% (same as normal)
   c M C H 33 38 γγ (more)
   d Orthochromati megal blast (normobiasts) pres nt
   e Anisocyto is poikilocytosi and p lychromatophilia
3 Bone marrow change
   a R d marr w is increased and soft
   b Larg numbe s of megaloblasts a e pres nt

D Th rapeutic Response to Vitamin B_{12} Extracts of Liver and "Li S b titut "

1 Disappe ranc of ymptoms and signs
2 R ticul yte response (n rmal count is less than 1%)
3 Impr eme t of anemia Occurs about 1 week after begin ning ad quat par nteral li er and 48 72 hours after ad qu t vitamin B_{12}

T tme t

Tre tm nt hould b b sed pon an accur te diagnosis Diff r ntiate f om nume ous oth ondition h ra teriz d by m c o- ytic an mi

A Spe ifi M ure Par teral the apy i strongly re om m d d although ral p eparation are available (se below) for those p ti ts who cannot o will not a cept parente al tre tm nt N ithe c ud liver xt a ts n r folic cid should be dministe d to P A p ti nts

The par nt r l administ ation of efined ext acts of liver or of vitamin B_{12} i uniformly follow d by optimal clinical and hemat logic l r sponses Following such therapy the P A p tient in rel p e will undergo an incr e in cir ulating re ticulocyt (ea hing a peak in 6 10 day) and a return of e ythrocyte and hemoglobin val to normal in 3 5 we ks

1 Pare t l do ages and indi ations
   a For un omplic t d P A in r laps
      (1) Initi l I M inj ction 20 30 mic ograms of rystal lin vitamin B_{12} (Cyanocob lomin N N R), vitamin B_{12} conce trat o refined (conc t at d) liv r t ct (Liver Inj ction U S P) Li r inj tion con t in 10 20 mi ogram of itamin B_{12} per cc give the quivalent of 20 30 mi ogr ms of vitamin B_{12} Vitamin B_{12} conce tr te may ause all rgic r ll
      (2) Subsequent inj tions
         ( ) Patients in seve e rel pse Give 15 20 mi vitamin B_{12} or quivalent very third or-

until blood values return to normal

(b) Mild relapse 15 20 micrograms weekly usually is adequate

b For P A complicated by degeneration of th spinal cord Doses in excess of the amounts needed for uncomplicated *P A may be required The degree of reversibility* of neurologic manifestations is inversely proportional to the duration of symptoms Improvement frequently is marked in patients with symptoms of 6 months duration or less less pronounced in patients with symptoms of 6 12 months duration and negligible in patients with symptoms of more than 1 year s duration It is advisable to treat all patients *intensively for at least 6 months and preferably for 1 2 years*

Physical therapy including coordination exercises is an important adjunct to the specific therapy of P A complicated by spinal cord degeneration

(1) Initial I M injection 30 60 micrograms of vitamin B_{12} or refined liver extract

(2) Subsequent injections 20 30 micrograms 2 or 3 times weekly for 6 months or more or until optimal neurologic impro ement has been demonstrated If optimal *neurologic improvement has not occurred at the end of* 6 months continue with 20 30 micrograms once a week

c Maintenance therapy The nutritional requirement for vitamin B_{12} in normal individuals is 1 0 microgram or slightly less each day This amount administered to patients with P A in whom blood values have been restored to normal and optimal neurologic r covery has been observed will provide satisfactory control in most instances 15 micrograms of vitamin B_{12} or refined liver extract I M once every 2 weeks should be adequate Larger doses may be necessary during periods of increased stress (infection prolonged debilitating or chronic illness etc)

The patient must be instructed as to the need for adequate and regular specific therapy for the remainder of his life The serious risks of neglect should be emphsized

2 Oral preparations The response to the oral administration *of powdered* hogs stomach liver stomach preparations and tablets of vitamin B_{12} (even in high dosage) usually is slow r less uniform and often suboptimal when compared with the response to parenteral therapy It is possible that th oral *administration of intrinsic factor* vitamin B_{12} complex substances or the inhalation of powdered vitamin B_{12} following intranasal dusting will prove to be satisfactory methods of treatment but the reliability of these methods has not been proved as yet

a Powdered hogs stomach (V ntriculin®)
b Liver with stomach (Extralin®)
c Tablets of vitamin B_{12}
d Powdered vitamin B_{12}
e Combinations in tablet form of vitamin B_{12} and intrinsic factor (derived from various sources) so called intrin*sic factor* vitamin B_{12} complex substances

B <u>General Measures</u> Periodic clinical and blood examinations should provide the basis for administration and dosage of liver iron and adjuvant drugs

1 Rest Patients with profound anemia should be at [illegible] rest. Hospital care may be necessary for patients with neural involvement (ataxia and sphincter disturbances)
2 Diet A diet adequate in calories, minerals and vitamins does not need to be supplemented with extra quantities of dietary liver unless for some reason the patient is not receiving parenteral liver therapy
3 Iron Ferrous salts may be given as an adjuvant to liver therapy when the iron content of the r b c is low (M C H C < 32% or [illegible] index). Elderly patients usually require more iron (see page 21[illegible])
4 Hydrochloric Acid, Diluted, U S P [illegible], 2-4 cc ([illegible] 1 dr) t i d in a glass of water taken through a glass straw with meals may be given to patients who have diarrhea as a complication of the achlorhydria. Patients must brush teeth with sodium bicarbonate immediately after meals to neutralize hydrochloric acid and prevent erosion of teeth.
5 Thyroid may be used in patients who fail to respond due to associated hypothyroidism
6 Measures to improve liver function in P A patients with associated hepatic damage have been suggested in an attempt to aid utilization and storage of the extrinsic factor (see page 2[illegible]0)

MACROCYTIC ANEMIA OF PREGNANCY (code No [illegible])
(Pernicious Anemia of Pregnancy)

A hyperchromic macrocytic anemia, characterized by megaloblastosis in the bone marrow usually occurring at end of the second or during the third trimester of pregnancy

<u>Treatment</u>

This anemia responds specifically to the oral or parenteral administration of folic acid or to crude liver extract (which [illegible] folic acid). It does not respond to the parenteral administration of vitamin B_{12} or refined liver extract (which contains virtually no folic acid)

A <u>Specific Measures</u> After delivery treatment with folic acid (or crude liver extract) may be discontinued since relapse does not occur
1 Folic acid 10 15 mg ([illegible] gr) or [illegible] daily
2 Crude liver extract 4 cc (1 dr) I M daily
3 Vitamin B_{12} and refined liver extract [illegible]
B <u>General Measures</u>
1 Give increased amount of animal protein even if diet is already adequate begin early and continue throughout pregnancy
2 If hypochromia occurs ferrous salts should be administered (see page 21[illegible])

SPRUE
(Anemia of Sprue code No 501 703)

Sprue is a chronic disease of undetermined cause (probably due to nutritional deficiency) characterized by sore mouth glossitis indigestion and recurrent diarrhea with steatorrhea It results in anemia asthenia emaciation and even death The anemia may be microcytic hypochromic normocytic hypochromic or macrocytic hyperchromic (megaloblastic)

Treatm nt

A Specific Measures
1 For hypochromic anemia Oral or intravenous administra tion of iron (see page 219)
2 For macrocytic hyp rchromic anemia (with m galoblastosis)
   a Cortisone or ACTH Cortisone 100 200 mg /day orally or I M or adrenocorticotropic hormone (ACTH) 40 100 units/day I M are important advances in the treatment of this form of anemia in non tropical sprue Improvement in the anemia is thought to be the result of increased ab sorption from the gastrointestinal tract of nutrients in food including hemopoietic factors (vitamin B_{12} folic acid etc)
   b Alternate therapy If megaloblastic an mia of sprue fails to respond to cortisone or ACTH tl erapy give one of the following
      (1) Vitamin B_{12} U S P 15 30 micrograms I M 1 2 *times per week* until remission is obtained and then 10 15 *micrograms* I M e ery 1 2 we ks
      (2) Folic acid U S P 10 15 mg (1/6 1/4 gr) daily orally or preferably I M
      (3) Crude liver extract 4 cc (1 dr) I M daily

B General M sures
1 High caloric high protein low fat high vitamin d et
2 Plasma and blood transfusions initially p r n for se ere hypoproteinemia and anemia
3 *Cortisone* or ACTH may be used in the hypochromic form in *dosages* utilized for correction of th megaloblastic anemia of sprue (see page 423) These substances in rease the ab sorption of nitrogen fats and other nutrients from the gastrointestinal tract
4 Vitamin K Menadione sodium bisulfite *10 mg* (1/6 gr) I M or I V *immediately* followed by 5 mg orally twice daily if hypoprothrombinemia *is present*
5 *Calcium* chloride phosphate or gluconat 2 Gm (30 gr) *orally* t i d and vitamin D 5000 20 000 units if hypo calcemia or tetany exist
6 Vitamin supplements by mouth

OTHER MACROCYTIC ANEMIAS

This group includes (1) nutritional macrocytic anemia (2) meg aloblastic anemia of infancy and (3) meg lol lastic anemias *sec* ondary to disease of or operative procedures on the *gastrointestinal* tract

Treatm nt.

A Sp ific Measu es G v folic acid crude liv r xtract or vitamin B_{12} f r prue (se page 226)

B Ge al Mea u P ovid an adequ te high protein high v tamin diet

APLASTIC ANEMIA (code No 501 900 0)

An cute or som times chron c diseas of the hemop ietic syst m characte ized by an alte ed prod tion of red blood cell resulting from a depression or exhaustion of the bone mar ow The co dition may be second ry to known marrow poi oning b t lso oc ur in the primary or idiop thic fo m

Di gno is

A A h story of exposure to ma r w to ins (g chemicals cer tain drug and i radiation) is often obtained Aplast c anemia is a persiste t p gr s ive anemia whi h lik c rt in other an mi s f ils t respond to li r iron or di t therapy Oth r c s s f an mia annot be demon trated Bleeding t nd ncy is comm

B Laborat ry Finding

1 A em is us ally normochromi n rmo ytic
2 Bon m rrow often (not inva iably) show apl sia with fatty and fibrous r pl c m nt
3 Leukop ni and thrombocytopenia s e u ally ma k d

T atm t

A Spe ifi Me su N are k own

B G l M

1 Tr sf ions R pe t d tra sf sion with car f lly typ d and cross mat hed whol blood m y p olong lif f a iabl periods Ra ly p t nts who equire d re el e a l g umbe of blood transfu ions may go into spontan ou re mis ion for s veral y a s
2 Di continu all unn c ss ry medi ation
3 Rem ve p ti t from xposur t uspe t d toxin
4 Diet Provid di t with dequate calori vit mins and min al
5 I on, liver a d vitamin th rapy Th s p p tions hould be given an dequ te t ial although th y of littl lue in tru aplastic nemi

HEMOLYTIC ANEMIAS

Cl ifi tion (Modifi d aft D m h k)

A H d D f t R d blood lls show an ppar t morpho log l def t wh h aus s inherent usc ptibility or pr disposition to hem lytic r tions

1 Sphe ocyti (familial) anemi (no racial te d n i) (on g nital hemolytic ict rus od N 513 093)
2 Target ell (Cool y) an mia (Medit rran an g oup) (f m ili l rythrobl atic anemia od No 501 997)

3 *Sickle cell anemia (Negro race)* (code No 513 9x4)

B Acquired Defect (Acquired Hemolytic Icterus code No 513 911 9) Red blood cells are originally morphologically normal Etiology includes the following

1 Infections bacterial and protozoal
2 Toxins *venoms drugs* and chemicals
3 Physical agents
4 Immune hemolysins
5 Agglutinins
6 Abnormal splenic mechanisms hypersplenism etc
7 Certain ovarian cysts

C Unknown Defect (code No 513 900 9)

Diagnosis

A History

1 Familial or racial hemolytic tendencies (hereditary)
2 Exposure to infections toxins agglutinins (acquired)
3 Symptoms of anemia (weakness dizziness palpitation and dyspnea) and hemolysis (fever chills abdominal pain and muscle cramps)
4 The acute hemolytic crisis is characterized by *sudden onset* of fever anemia icterus splenomegaly with tenderness and shock

B Physical Examination Pallor icterus tachycardia and fever may be present in all types Splenomegaly and hepatomegaly occur in the acquired and familial types

C Laboratory Findi gs

1 Increased blood destruction gives rise to
   a Normocyti anemia
   b Bilirubinemia
   c Hemoglobin mia (see table on page 230)
   d Increas d fecal and urinary urobilinogen (urine dark)
2 Morphologic r b c defects Sphero ytes target cells or sickle cells (see classification above)
3 Altered fragility of r b c (always present in hereditary types)
4 Increased blood formation is evidenced by bone marrow hyperplasia and presence of immature erythrocytes etc
5 Leukopenia sometimes is present in the acquired form

Treatment of Acute Hemolytic Anemia (Hemolytic Crisis)

Patient must be tre ted at on e H sp taliz whe ever possible

A Severe Form

1 Treat shock (see page 32) and acute anemia *Careful observation of clinical progress is essential*
2 Whole blood transfusions Blood must be carefully typed (major group and Rh type) and cross matched both at room and body temperatures Severe reactions may occur even with careful cross matching Sturgis recommends a cautious preliminary administration of 50 cc of suitable blood followed by an observation period of 1 hour If no re action occurs the remainder of the blood may be giv n over a 2 to 3 hour period
3 Plasma If patient cannot tolerate whole blood transfusions (because of hemolysis of injected red cells) plasma trans fusions should be administered when necessary to combat shock

4 Specific causes should be treated when known
 a Infections Employ ep cific anti infectiv and supportive m sures (e p ges 496 t 514)
 b Discontinue drugs or remove from contact with poi ons o ther hemolysins
5 Corti otropin (ACTH) and cortisone may produ e striking remissi ns of the hemolytic reaction and at least tempor rily tide the patie t o r until su h time that other more specif c me sure an be safely inst tuted F r do ag of ACTH and ortisone see pag 423
6 Spl e tomy After shock and feve have subsid d and patient gen ral physi al status has improv d suffic ently co sid r f r early spl nectomy If hemolytic shock is p o gre siv despite vigorous supporti e m a ur (up to 3 t 4 500 c tran fusions) m gen y spl ne t my may be indi cat d Wh n the cause is unknown and r action has been s ver con ide for splenectomy after pati nt has cov red f om th hemolytic cri is Spl nectomy is not ge erally as su c ssf l in the a quired form as it is in the familial type and i generally without b n fit in i kle ll and famili l erythrobl sti anemias

B Mild F rm If the hem lytic reaction is mild only tre tment with anti infecti agents and orti ot opin or co ti one m y be necessa y In th familial type en though th pati nt is asymptom tic ple t my may be advis ble

T atme t of Ch oni Ph s

A In truct patient t a oid strenuou rcise inf ctions xpo sur to t mperatu e xt em s and ing stion or contact with drugs or toxins
B Splene tomy If p tient fails to improve on conservativ th ra py ons d f r spl ectomy (see abo e) When abn rmal antibodies (iso and auto antibodies) re pres nt th condition is le s often am nable to splen ctomy
C Cobalt hlorid 200 mg orally daily has b en repo ted to bring about improvem nt in th h onic phas s of si kle c ll nd Medite anean an mias

HEMOGLOBINURIAS

Di gn i (See t ble on th following page)

Tr tm t

A Spe ifi M a s R mov or tr at causative f ct rs
 1 P oxy mal old h m globinuria Tr at stag of syphilis pr e t (se pag 440)
 2 F vi m Pr hibit ing stion of fa b ns
B Symptom ti nd S pportive M
 1 H m lytic symptom
  a Tr t acute hemolyti r ction (e p g 228)
  b Tr at f e chills and m scul r a hes and p ins symptom ti ally
 2 Anemia symptom Tr at anemia cording to type ve ity

DIAGNOSIS OF HEMOGLOBINURIAS

Disease	Precipitated By	Positive Laboratory Tests
Paroxysmal cold hemoglobinuria (code No 510 500)	*Chilling or* cold	Blood test *for syphilis* Donath Landsteiner test
I aro ysmal *nocturnal hemoglobinuria* (code No 510 500)	?	Acid h molysis test *Hemosiderinuria test*
Fa ism (code No 010 3761)	Ingest on of fava beans	Non
March *hemoglobinuria* (cod No 510 500)	Exercise	I on

Prophylaxis

A I aro ysmal Cold H moglobinuria *Protect against chilling or* cold

B March Hemoglobinuria A oid strenuous exercise

POLYCYTHEMIA VERA (ERYTHREMIA) (*code No* 501 792)

A chronic disease of the hemopoietic system of unknown etiology characterized by overactivity (erythroblastic) of the bone marrow with resultant overproduction of red c lls and *hemoglobin It is manifested by a reddish purple hue to the skin,* increased blood *volume* capillary *engorgement* hemorrhages venous thrombosis arterial hypertension hepatomegaly and splenomegaly and symp toms referable to multiple organ systems It is to be *differentiated* from the polycythemias that may occur *secondarily to known physio logical stresses which also cause* increased bone marrow activity

Tre tment

A D finitive M sures To reduce the total red blood *ell volume*

1 Venesection (*phlebotomy*)
   - a Ltilize *careful blood hematocrit dete mination in follow* ing efficacy of treatme t
   - b Remove 500 cc of blood daily until the blood hematocrit reaches a normal *level Subsequently* 500 cc phle *botomies every* 2 3 or more months may be sufficient to *control mild cases*

2 *Irradiation inhibition of red cell formation*
   - a Radioactive phosphorus (P^{32}) *This i the most effective anti polycythemic agent* available at present Its use is restricted to institutions equipped to handle radioactive material *It is indicated in patients in which the polycy* themia cannot be controll d readily by *venesection alone* and especially *in patients* with a history of thrombotic or *thrombophlebitic* episodes 4 6 millicuries of P^{32} (as a phosphate salt) in 2 6 cc of isotonic (1/2 1 1/2 dr) sodium phosphate solution are given I V *If the polycythemia is* not controlled following a singl I V *injectio* subse quent *injections of* 3 5 *millicuries* are given at intervals

of 2 months until the dis ase is brought under cont ol

b X ray i rad ation Whol body or spray irradiat on may be of b nefit when gi en in r p ated dosag s Ir radiation of the long bon s has prov d to be le satis factory than whole body i r di tion in ontroll ng th dis

3 Anti polycyth mi d gs

a Ph nylhyd azi hyd ochlorid r cetylphenylhydr i *Follow patient carefully clinically and with blood studies during and after therapy* Th se mpounds are most saf ly us d if th y are administered s maintenance the apy aft r the hem tocrit h be n e stor d to normal by r p ated v n s cti ns Gi e 0 1 0 3 Gm (1½ 5 gr) by mo th w kly s a maint na ce d The u of phenylhyd azine to l wer n l vated erythro cyte count omitting the us of v ect on t stablish o mal b and hematocr t lev ls i h z dous proced re Ano e na s and omiting e th principal disadvantages f ph nylhydra ine th rapy

b Triethyl n m l mine (TEM) ha b n employed but experi c has b e lim ted

B Ge l M a ures

1 Prov de symptom tic relief as n ed d

2 Di t The diet should be adequate and nutritious Ther is no rat nal to starvation diet r diet excluding rmal amounts of blood building food

3 Inf rm pati nt r garding the natu e of h dise

C T atm nt of C mpli tions Vari s with the st tus of th p lycythemia and th rel tio of ompli ati s to th apy s well as w th th n t re and sit of th ompli tion Th ombosis and hem rhage are c mmon ompli ations

ACUTE AGRANULOCYTOSIS (code No 502 7911)
(Agranulocytic Angina)

An acut and if untr ated u u lly f tal illne s of dult charact riz d by extr me g anulocyt p nia whi h i f llowed by a fulminating sep is associat d with ul e ation of skin and m ous memb an s It i known to be caused by certain d gs and h mi cals but i som tim s of unkn wn o igin

Di gno i

A H tory of M di tion with C t in Dr gs

S lfonam de	Bism e ®	Nitrogen m tarda
Aminopyrine	Thiou acil and	B rbitu at (? ar)
A etanilid	lat d compounds	A pirin (r e)
Cin hophen	Gold and other	Tridione®
N ocin hophen	he vy m t ls	

B Ph i l F mination Sudd n ons t of s psis and f ve in flammation and l tion of mu ous memb a e of throat and l s fr que tly of othe ar as and of th skin and r gional ad nitis

C Labo tor Findi g

1 Seve l kopenia nd granulocytopenia

DIFFERENTIAL DIAGNOSIS OF THE LEUKEMIAS AND RELATED DISORDERS

Disease	Duration	Spleno megaly	Hepato megaly	Lymph nod s	WBC Total Count (usual range)	WBC Differential	Bone Marrow
1 Chronic granulo cytic leukemia (code No 502 792)	36 mos (8 mos to 16 yrs)	+++	++	±	20 000 500 000	Immature myeloid cells	Myeloid infiltration
2 Chron c lympho cytic leukemia (code N 503 792)	42 mos (8 mos to 8 yrs)	++	+	++	30 000 100 000	Immature lymphoid cells	Lymphocytic infiltration
3 Chronic monocyt c leukemia (code No 506 792)		±	±		25 000 100 000 (2 000 500 000)	Immature monocytic cells	Monocytic infiltr tion
4 Acute leukemias (code No 50 7921)	8 wks (2 wks to 6 mos)	±	±	±	15 000 30 000 (2 000 100 000)	Blast cells (often un differentiated)	Leuk mic infiltration Blast cells may be difficult to differentiate
5 Aleukemi my l sis (code No 502 7923)		+	±	±	4 000 (1 000 5 000)	Immature cells (few)	Leukemic infiltration (not always)
6 Agnog nic myeloid metaplasia of sple n (code No 520 958)	11 yrs	+	±	±	20 000 50 000	Immature myeloid cells Nucleated r b c	Normal aplastic or hyperplastic marrow

Not The an mia associated with the leukemias is usually normocytic and m y vary from mild to severe
Th pl tel ts a e usually in rea d in ch oni granulocyti leukemia but may be decreased in ll other
l uk mi s th platel ts are usu lly decr a d

(2) Parenteral administration of leucovorin (synthetic Leuconostoc citrovorum factor) in a ratio of leuc o in to ant gon st of 1 1 10 1

(3) B ood t ansfusio s - Spac d at inte vals to maintain RBC at 2 5 3 0 million/cu mm

(4) Antibiotics if infection develops (use appropriate anti bioti after causative organism has b en isolated and sensitiv ty tests perform d)

2 Purine ant go i ts The a ag nts only rec ntly introduced ar still in an inv st gati e st ge of d velopment but in gen al th y appe to be l s toxic than the folic acid antagonist

a Ag ts avail ble for use

(1) 6 m rcaptopurine (Purinethol® 6 M P)

(2) 6 thi guanine

(3) O Dis oacetyl l s rine (azas rin)

b Indic tions for use Acut l uk mia, specially in adults An initial remission rate of approximately 55% has b en reported in adults and 50% in child en following tr at ment with 6 mercaptopurine The status of thi guanin and azaserine r mains undete mined at pr sent

c D sag and procedure

(1) 6 m r aptopu in (6 M P) 2 5 4 0 mg /Kg body weight/day

(2) Thioguanine 2 5 mg /Kg body weight/day

(3) A as rine 2.0 mg /Kg body weight/day

Thes compound are admini t red orally in a single dose or in a divided dos twice daily The rang betwe n th therape tic and the t xic dose is wider than it is with th folic acid antagoni ts and hen e pu in antagonists ppear to be somewhat safer to use 6 mercaptop ri e i the dr g of choice for initial therapy it is administ d d ily rega di s f the developm nt of pronoun ed *degr es* of leukope i and n ut openia or pancytopenia until blast (stem) c lls p olymphocytes progran locytes or pro monocyt s virtually disappear from the bon marr w or until toxic ymptoms d elop (se below) Treatm nt *then* is dis ontin ed and the patie t is wat h d cl sely If complete clinical and h matologi r mi sion naues no f rther t eatment is given until relapse occurs If no re mission or an incomplete remission is obt ined th pa tient is plac d on maintenance therapy (usually less than 2 5 mg /Kg body w ight/day) In cas s in whi h r ist an to 6 me c ptopurine ppe rs to b dev loping, fa vorable respon e sometim s can be obtain d by g ving thioguanine o azaserine in combination with 6 M P

The c e sful u e of purin ant gonists d pends upon los ob ervation of th pati nt and on se ial blood and bone marr w examinations The bon marrow athe than th periph ral blood is mployed as the p in ipal therapeutic guide During the st ge of drug induced bon marrow suppression, prope ly spaced blood tran fu ions m st be given as a supportive m s ur

d T i ity T xic manifestations of mild d gre h ac teriz d by anorexia and naus a f equ ntly e obse ved

treatment are markedly enlarged lymph nodes especially if causing pressure symptoms anemia due to bone marrow infiltration or extensive leukemic infiltration of viscera skin etc

(1) Triethylene melamine (TEM) dispensed in 1 mg (1/60 gr) and 5 mg (1/12 gr) tablets for oral use This relatively new drug appears to be the agent of choice because of its pronounced destructive effect on the mature lymphocyte *Use with caution* especially if the leukocyte count is below 50 000 cells per cu mm If the leukocyte count is in excess of 50 000 cells per cu mm give 5 mg (1/12 gr) of TEM together with 2 Gm (30 gr) of sodium bicarbonate orally 1 hour before breakfast (Sodium bicarbonate prevents reaction of TEM with substances in the gastrointestinal tract and permits absorption of the entire dose) On the following day give 2 5 mg (1/25 gr) of TEM plus 1 Gm (15 gr) of sodium bicarbonate 1 hour before breakfast Then wait 1 week and check blood counts Repeat the administration of TEM at weekly intervals reducing the weekly dose to 5 mg (1/12 gr) when the leukocyte count falls below 50 000 cells per cu mm and to 2 to 3 mg as the leukocyte count approaches normal When normal leukocyte values have been attained discontinue TEM therapy Remission may last from 6 to 24 months However during remission blood examinations should be made at intervals of 1 or 2 months

If the initial leukocyte count is above normal but below 50 000 cells per cu mm give 5 mg (1/12 gr) of TEM or less together with sodium bicarbonate once each week until the desired result is obtained

(2) Nitrogen mustard (HN_2) Remissions obtained with *nitrogen mustard* in chronic lymphocytic leukemia usually are shorter than those obtained with TEM and therefore TEM is preferred to nitrogen mustard therapy For details of administration of nitrogen mustard see page 241

b Chronic granulocytic leukemia In contrast to chronic lymphocytic leukemia chronic granulocytic leukemia always should be treated at the time the disease *is first discovered* *Agents available for treatment are listed in order of preference*

(1) Triethylene melamine (TEM) This agent is quite effective in controlling chronic granulocytic leukemia for long periods of time *It has the advantage of giving remissions* lasting from 3 to 10 months but due to the large doses employed it has the disadvantage of causing nausea and vomiting (sometimes severe) in some patients for several hours after administration However nausea and vomiting may be minimized by administering 25 to 75 mg (3/8 1 1/4 gr) of chlorpromazine (Thorazine®) before and at 3 hour intervals after the administration of TEM It is important to remember that the dosage schedule for TEM in chronic

granulocytic l ukemia is signifi antly high r and there fo qu ite diffe ent f om that used in ch onl lympho ytic l ukemia

If th l ukocyte count is in e c ss of 50 000 cells per cu mm giv 10 mg (1/6 gr) of TEM and 2 4 Gm (30 60 g) of odium bicarbonate orally 1 h ur befo b akfast On the following d y give 5 mg (1/12 gr) of TEM and 2 Gm (30 gr) of sodi m b ca bonat 1 hour befo e breakf st Repe t the bove p o du e at we k ly interval after first pe fo ming blood ounts Re duce w kly dos of TEM when the leuko yt count f ll b l w 50 000 c ll per cu mm and dis ontinue th r apy when l uko yte valu s approach n mal

If the initi l l ukocyte count is below 50 000 ells pe u mm tart with 10 mg (1/6 gr) of TEM weekly If the ponse to the 10 mg (1/6 gr) dose is unsati f ctory give 12 5 15 mg (1/5 1/4 gr) do es f TEM e ch w k

(2) Myleran (G T 41) dispensed in 2 mg (1/30 gr) t bl ts fo or l u Utiliz only in p ti nts ha ing hronic granulo ytic le k mia with high l ukocyte ount *Do not use in patients with normal or subnormal leukocyte counts* Give 4 8 mg (1/15 1/8 gr) daily by mouth until maximum hematologi improvement is achieved, pe fo ming blood ounts v ry se ond o third d y Thrombocytop nia of se ious d g e may d velop on daily oral dos of 10 mg (1/6 g) o mo e When th leuk yt count has r turned to a no m l le l, plac th p ti nt or a mainte an d s ge of 2 4 ng (1/30 1/15 gr) d ily Myele an i in ffective in a ut leuk mi and in chronic lymphocyti l uk mia

(3) 6 mer ptopurin (6 M P) dispen ed in 50 mg (3/4 gr) tablets fo o al us Give 3 5 mg (1/20 1/12 gr)/ Kg /day in a ingle o equally divid d dos s by mouth until th leuk yte ount app oache normal Maint nance th rapy (2 5 mg /Kg /d y o slightly les) then is q ired to ontrol the dise e 6 M P is ineff c tive in hronic lymphocyti l ukemia

(4) Ur thane® (ethyl carbamat) dispensed in 0 5 Gm. (7½ gr) plain or ent ri coated tablets for oral u This compound will ont ol hroni gra ulocytic l uk mia f r r latively long period of time but it has the dis advantage of ca sing n a and ano ia in a high proportion of p tients and omiting in a m Give 0 5 1 0 Gm (7½ 15 gr) t i d until leukocyte count return to no mal, th n place on maint nan e th r py gi ing the smallest amount ne e sa y t ke p the l kocyt ount at o near n rm l le els

(5) Fowl s lution (pot ssium ar nite ol tion) may be of val e when radiation the py is com aindicated or unavail ble

Fork technic of administration begins with an i itial dose of 0 3 cc (5 gtt or 5 min) t i d o lly f 2 days This dos is inc a d by 0 05 cc (1 gt o 1 min) ery othe day until a dose of 0 8 cc (10

gtt or 10 min) t i d is reached Further increase of dose 0 05 cc (1 gt or 1 min) daily until toxic symptoms occur (anorexia nausea and vomiting diarrhea) or the leukocyte count approaches normal Discontinue the drug for 2 5 days and then decrease the maximum dose by 0 05 cc (1 gt or 1 min) daily until a maintenance level of 0 3 0 5 cc (5 gtt or 5 min to 8 gtt or 8 min) t i d is reached This dose is continued indefinitely keeping the patient under careful observation

(6) Nitrogen mustard (HN_2) May produce full clinical remissions in certain early and moderately advanced cases of chronic granulocytic leukemia these are similar to x ray response but are of shorter duration Nitrogen mustard is not recommended for acute leukemias (see page 241)

B Treatment of Certain Hematologic Abnormalities

1 Anemia Determine whether or not the anemia is myelophthisic or hemolytic

a Myelophthisic Treat with the appropriate anti leukemic chemotherapeutic agent Adequate nutrition including supplementary vitamins is important but the administration of iron salts is of no value Periodic transfusions of whole blood may be necessary until the desired chemotherapeutic result has been attained

b Hemolytic Treat with cortisone or ACTH (see treatment of acquired hemolytic anemia page 228) If the hemolytic anemia of chronic leukemia cannot be controlled by hormone therapy splenectomy may be ne essary

2 Bleeding tendencies Purpuric and hemorrhagic phenomena are often due to the associated thrombocytopenia Transfusions of fresh whole blood are indicated Toluidine blue is reported to be of value

3 Hemolytic crises See page 228

C Other Symptomatic Measures

1 Tr atment of pruritus See page 67

2 Treatment of ulcerative stomatitis See page 261

LYMPHOMAS (code No 820) and LYMPHOSARCOMAS (code No 821)

A large ill defined group of diseases characterized by progressive proliferation of the hematopoietic tissues and manifested by variable involvement of lymph nodes spleen bone marrow liver and other reticuloendothelial structures together with constitutional symptoms of fever weight loss hemorrhagic tendencies and anemia The exact interrelationships of these diseases are not known therefore all classifications remain arbitrary and controversial Clinical types are often indefinite and may merge into one another

Treatment

Certain general principles of management may apply to these diseases as a group

A Gen l M as re Measure directed toward maint ining opt mum g n ral health hould be carri d out but they s ldom influ nc the course of the diseases per se

B Radi tion and Drugs Th effects of r diation and c rtain ch moth rap utic drug may be palliative o arresting b t ar seldom if ever ur ti The sus ptibility to a pe ifi ther peutic agent and the dur tion of effectivene s (for both palliation and arr st) will v ry not only with e ch disease but also with the stage of the diseas je eviou th apy and from pati nt to p ti nt The table on pag 236 outline the r sponse of the various hematopoi ti diso ders to r di th ap ut c and ch mothe ap utic ag nts

Alth gh clini al xperi nce has hown that certain of these conditions a e m e am nabl to therapy than othe s fin l e aluation must est upon a t ial of th apy

HODGKIN S DISEASE (code No 550 954)

A progre siv and inva iably f tal r ticuloendothelial granulomatous (lymphomatous ?) dise s of unknown etiology involving the lymphoid tissu s of th body It is manife ted by progressi e enlargem nt of lymph node ple n and oth r lymphoid structures and constitutional symptom of f v r weight los and anemia Th lesion can involv any and all tissu s ther fore the manif stations are prot an S ve al linical and pathologi al type ar r cogniz d, ranging f om us ally mo be ign fo m p ragranuloma with a survival tim of 3 or more years to a rapidly fatal form sa coma with a survi l time of l s than 1 yea The di gnosis arri ed at on lini al grounds mu t be confirmed by biopsy to diff nti te th ondition f om the hroni infectious g anulomas and f om the other lymphoma

Tre tme t.

A D fi itive M e) (No known pecific th rapy is available)

1 Irr di tion At pr ent, local or total body x irradiation probably i the p lliati e m as r of h ice Clini l im provem nt is attrib table to r gression in th si of in lved lymphatic st uctu s and in no way rep es nts a cure of the dis The e ge urvival time is probably un changed, but the p ti nt is m de more comfortabl Un fortunately l sions becom p ogr ssiv ly ref ctory afte subs quent our s of ray therapy Nit g n musta d th py should b tried on radio-resi tant patients

2 Combined radiation and nit ogen mustard therapy may occ sion lly achi ve benefits un tt inable by eithe m thod us d alone

3 Nit ogen mustard [methyl bis(hloroethyl)amine hyd o-chloride] (HN_2) HN_2 at present is th nit gen m stard most commonly employed Th indi tions for it use are

a Widely dis min ted hronic granulomatous Hodgkin s disea that ha become efra tory to x r y th rapy

b Chronic granulomatous Hodgkin di as with visc ral involvem nt (e pecially lung pare chym)

c Hodgkin s rcoma f lling to respond satisfactorily to

BLEEDING DISEASES SUMMARY OF DIAGNOSIS AND TREATMENT

	Diagnostic Criteria	Mechanism	Disease	Treatment
Capillary Purpura	Positive capillary fragility (Rumpel-Leede) test. Normal thrombocyte count, clot retraction, prothrombin concentration and coagulation time	Mechanical	Whooping cough, [illegible]	R[illegible] [illegible] supportive [illegible] [illegible]
		Infection	Meningococcemia	Antibiotics
		Embolic	Subacute bacterial endocarditis	Antibiotic
		Allergy	Food allergy, drug idiosyncrasy, Henoch-Schönlein purpura	Removal of allergen, antihistamines, corticosteroids
		Vitamin deficiency	Scurvy	Ascorbic acid
		Disordered elastic tissue	Ehlers-Danlos syndrome	R[illegible]
	Prolonged bleeding time only	Metabolic	Uremia, hypothyroidism, anoxia	Treatment of underlying disease
		Nonconstrictility	Hereditary capillary fragility (pseudohemophilia)	Avoidance of trauma, topical thrombin
	None.	Telangiectases	Hereditary capillary telangiectasia	Topical thrombin, electrocoagulation.
Thrombocyte Abnormalities	Thrombocytes decreased. Prolonged bleeding time, delayed clot retraction. Normal prothrombin concentration and coagulation time	Idiopathic	Idiopathic thrombocytopenic purpura.	Corticosteroids, fresh whole blood, platelets, splenectomy in selected cases
		Allergic	Quinidine	Removal of allergen, corticosteroids
		Hypoplastic	Chemicals, drugs	Stop drugs, fresh whole blood
		Myelophthisic	Leukemia	Treatment of underlying disease
		Unknown	Thrombotic thrombocytopenic purpura	Corticosteroids (?)
		Abnormal thrombocytes	Thrombocytopathic purpura	Fresh whole blood
Coagulation Defects	Prolonged coagulation time, normal prothrombin concentration	Antihemophilic factor deficiency	Hemophilia	Fresh blood, lyophilized plasma or Fraction I
		Plasma thromboplastin component deficiency	Plasma thromboplastin component deficiency	Fresh blood
	Prolonged coagulation time, decreased prothrombin concentration	Accelerator globulin deficiency	Hemophilioid states	Fresh blood, lyophilized plasma
		Serum prothrombin conversion accelerator deficiency	Serum prothrombin conversion accelerator deficiency	
		Hypoprothrombinemia	Hemorrhagic disease of newborn, vitamin K deficiency, liver disease	Vitamin K
		Fibrinogenopenia	Abruptio placentae	Blood, Fraction I
		PT in[illegible]	C[illegible] [illegible] [illegible]	[illegible] deficiency
		Anticoagulant		Cortisone (?) Toluidine blue or protamine [illegible] (for heparin) [illegible]

Modified from Osgood and [illegible] prepared with permission [illegible] (To be published in A.M.A. Archives of Internal Medicine)

Treatment

A Prot ct F om St e ses that Agg a at Ble ding (To antins)

1 Limit activities Advise occupations sports or oth r activities which involve minimal physic l ha ards

2 Protect ar as f body which ar subj ct to injury

a L b icate nostrils and oth r uperficial bleeding sites with petr latum t p ev nt drying and racking of scabs

b Apply p ot cti e bandages splints or asts to existing wounds to p e nt r pe ted hemorrhag s

c Bandag lower extr mities carefully to supply support to surfa e kin vess ls when indicated

3 S gical p ocedure Limit the number and xt nt of operative procedur s to a minimum

a Consid r need f r le tive surg ry carefully

b Minimi e trauma extent and duration of operative procedures

c P rform operative procedur in stag s (e g extract one tooth or remove one t n il at a tim)

d Prepar pati nt for surgical procedures by app op iate h mostatic technics (e g preoperative fresh whol blood transfusion or vitamin K)

4 Co ect intrinsi facto s

a Tr at ardiac f ilure or hypertension when present

b Co rect symptoms of violent coughing sne zing, etc

B Lo al Ble ding Must B Tre ted P omptly

1 Bandaging and p e sure dr ssings for hemostasi

2 Topical thrombin may be applied locally for hemostasis

3 Thromboplastin Less eff ctive than thrombin

4 Abso bable hemostatic dressing (Gelfoam® Oxycel® Fibrinfoam®)

5 El ct o coagulation

6 Ch mical ut riz tion Usually of value only for mall ble ding sites e g epistaxis (ee p ge 112) Use tri chloracetic a id fe ri hloride tannic acid or chrome bead

7 Snak venom (Russell Viper) 1 10 000

C G oss H m r hage or Ge e liz d Bleeding Must be tr at d by m a ures which ombat hock, control bleeding, and correct anemia

1 Combat shock (s e page 31) Fre h whole blood (not older than 3 4 hours) is p f rred because of its hemostatic as well as it antishock and antian mic eff cts Plasma may be us d when whole blood is not availabl

2 Cont ol bl ding

a Blood and d rivatives

(1) Fr h whol blood transfusions I V p r n. (see page 33 under Shock) The platelets pre ent in refrige ated whole blood deterio at largely within 12 hours al though the pl sma hemostatic ff cts may persist for much longe pe iods Blood t ansfusion, car fully admini t r d, should be onsidered as an eme g ncy upportive me sure in all forms of hemorrhage re gardl ss of ause

(2) Plasma t an fusion Tran f sion of fresh or frozen pla ma (not old r than 10 days) provides prothrombin,

fibrinogen antihemophilic globulin and *certain other* factors which may be of value in controlling bleeding There are no platelets in plasma

(3) Antihemophilic Globulin U S P (Cohn Fraction I) in a erage doses of 200 mg (sometimes up to 600 mg may be required) in 5 10 cc physiological saline causes a decrease in the spontaneous clotting time of *the blood of hemophilic patients*

b Vitamins

(1) Vitamin C *(ascorbic acid)* *(See page 63)*

(2) Vitamin K (menadione) (See page 60)

(3) Vitamin P and related compounds Although experi mentally this group of agents has been reported to be capable of increasing the capillary resistance in cer tain disease states in human beings clinical studies have been generally discouraging Two preparations available are

(a) Rutin (N C A) 20 30 mg q i d

(b) Hesperidin Chalcone *(N C A)* 50 *mg q i d*

c Corticotropin (ACTH) and cortisone may produce striking remissions of the purpuric or hemorrhagic reaction (in creased red cell count and platelets and decreased bleed ing tendency) and at least tide the patient over until such time as other more specific measures (e g transfusions surgery) can be safely instituted Dosages of cortico *tropin of* 25 mg *I M q i d are generally employed* in severe cases larger doses may be indicated (see page 423)

d Antiheparin ag nts In anaphylactoid shock secondary thrombopenic purpura irradiation reactions nitrogen mustard therapy leukemia menorrhagia and in certain other conditions heparin or a heparin like substance is liberated in excess and appears to be responsible for a bleeding tendency (hyperheparinemia) This excess of *heparin may at times be counteracted by the use of two* agents protamine sulfate or toluidine blue which inact ivate heparin by forming stable chemical complexes

(1) Protamine sulfate 50 mg in 5 cc aqueous solution I M every 4 6 hours until petechiae c as to appear 150 mg in 250 500 cc of 5% glucose or normal saline given slowly I V is often given at the time of the *first I M injection Protamine titrations (see* J A M A 139 1251 1949) may provide an index as to effi acy of treatment

(2) Toluidine blue 6 8 mg /Kg body weight dissolved in normal saline given slowly I V (over a 2 hour period) daily for 3 days and followed by 2 4 mg /Kg for 3 additional days In preparation of the dye solution it must be passed through a Seitz filter for sterilization and removal of larger dye particles Transient nausea *and vomiting* bluish tint to skin and blue *col ration* of urine and feces may be encountered

e Splenectomy Removal of th spleen may be indicated in selected cases of primary thrombocytopenic purpura and in cases of secondary thrombocytope ia due to certain

splen: dis as s (hyp r pl nism) D monstr tion f m gakary cytic acti ty by the bone ma row is s ential to the proper evaluation of th individual a In g n ral splen ctomy is adv sed only in the hyp rspl ni fo m of thrombocytope ic purpura (primary or e onda y i e Gaucher s Banti s and g anulomatous diseas s of the spl n) but the op ation may be indi at d in v ry s lected case of bon marrow m g karyocyt d fici n y Th d ci ion a t need f r sple ctomy hould b made by a train d h mat logist

Rh FACTOR
(Reaction due to Blood Transfusion code No 010 38x)

When blood cont ining th Rh fa to (from Rh positive d o) i introdu ed into a p r on without th f ctor (Rh n gative) the Rh factor cts as an antigen and gglutinin may d v lop against it (anti Rh agglutinins) Aft r the agglut nins hav developed Rt positive blood from don r i n longer suit bl f r tran fus on purpos s sinc agglutin ti and h m lysis f the dono ells is lik ly to occ r Th s ve ity f s ch t ansf s on rea tion (as with int gro p r ction) may va y conside ably Rh s ns tization is al o k own to de lop by multipl p egnan ie in Rh n g tiv women with Rh po iti e h band

P oph l i

A General Rules.

1 All blood fo t an fusion sho ld be Rh typed in addition to con ntional int group typing and th n c o s mat hed with r ipient s blood
2 Rh positive individual m y safely r i blood only from Rh p itiv dono s
3 Rh n g ti indi iduals m y saf ly rec ive blood only from Rh g tive don s

B Specifi Rul *Never give Rh p sitive blood to any of th f llowing*

1 Rh g tiv individuals wh h v had pr viou t ansfusions
2 Rh g tive w om n who h ve had multiple pr gnan ies by Rh positive h bands
3 Rh g ti e pr gnant women
4 Infant with rythroblastosis

Treatm t

See und r t an fusion r actions on p ge 249

BLOOD TRANSFUSION

Physiologi al R tion)

Blood is gi n in o d to

1 In r as ci c lating fl id volume
2 Inc ase o yg n ca rying c pa ity of blood
3 In ase in prot in concent ation
4 Increas coagulability of blood
5 Incre s immune bodi s

Contraindications

Transfusions must be given carefully in cases of acute pulmonary edema cardiac failure nephritis and pulmonary embolism or infarction

Preparation for Blood Transfusions

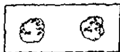
A Typing and Cross matching

1 Determine blood type of recipient Use known typing sera Anti A Blood Grouping Serum U S P (or serum from Type B blood) and Anti B Blood Grouping Serum U S P (or serum from Type A blood) Blood type may be determined according to chart below

Recipient s r b c		Recipient s Type	
Anti B Serum	Anti A Serum	Landsteiner	Moss
+ Agglutination	+ Agglutination	AB	I
0 Agglutination	+ Agglutination	A	II
+ Agglutination	0 Agglutination	B	III
0 Agglutination	0 Agglutination	O	IV

2 Donor should always be of the same blood type as recipient Cross match as indicated below In emergency situations Type O (Moss IV) blood (universal donor) may be administered to any type Type AB individuals may receive blood of any type (universal recipient)

3 Always perform direct compatibility test between donor and recipient blood before each transfusion even if the blood came from a previously compatible donor This is done by mixing recipient s cells (RC) and donor s serum (DS) on one side of a glass slide and donor s cells (DC) and recipient s serum (RS) on the other side



The slide is rocked back and forth for 5 minutes and examined with the low power microscope If there is any agglutination or suggestion of hemolysis a new donor must be found

4 Whenever possible determine the Rh of the recipient Rh negative recipients should receive only Rh negative blood Rh positive recipients may receive Rh positive or Rh negative blood in emergencies when no compatible Rh positive blood is available

B Diseases Which May Be Transmitted By Blood Transfusion

1 Syphilis Donor should always have a serological test for syphilis

2 Malaria and hepatitis Blood from a person with a history of malaria or infectious or homologous serum hepatitis should not be used

T hni of Blood Tran f o

Th re e tw methods fo administration of blood (1) indir t t anst ion using modified blood (blood to wh h anticoagulants ha be n added and (2) dire t t ansfusi n (bl od transfe ed dire tly by vein without addit on of a y sub tance) The first method is now used almost exclusively

A Indir ct T ansfusion Using Modifi d Blood C trate is u ed most f equ ntly a th anti oagulant
 1 Collection of blood A sp l lly p pa ed vacuum flask that tains 50 cc (1 2/3 oz) of 2 5% sod um citrat is om monly u d to collect 500 c (1 pt) of blood The collection appa atus i equipped with a valve that allows the amount of suct on t be egulat d This is the technic used in most blood bank
 2 Admin st tion If the blood i taken fr sh it m y be ad minist d d rectly from the v uum flask A pe ial trap th t cont ins a fin mesh f lter and a drip measure is in serted int the fla k Howe er since blood often contains m ll clots that t nd to blo k the filt r a fla k with ope ing t top a d bottom is used a the r se voir for the t anst si n
  a About 250 c (½ pt) of s line is pla d in the bottom of th fla k a d the tubing is fill d with salin le ving about 100 c (3 oz) of lin in th flask Cl ar all air from the tubing
  b Th blood is th n passed through a funnel layer d with at le st 4 thickn s s of st rile washed surgi al ga ze
  c Th blood is then admini ter d as an int a nous infusion as soon as the filt ri g is compl t

B Di t Tran f sion This t chnic u s an apparatus con isting of a l g syring nd a smooth w rking 3 way topcock The blood i drawn into the syringe from the donor th stopcock tur d and th blood inj ct d imm diately int recipient

P autions in Administ tion
A Always administ alk li (5 Gm or 75 gr sodium bicarbonate) orally or 250 cc (½ pt) M/6 sodium lactat before beginning transfusion Prophylaxis for hemolytic reaction
B Nev r warm blood b f e administration
C A rage r te is 40 to 50 drops pe minut or 150 cc (5 oz) per hour Can be giv n at maximum rate of 1 cc (15 ℳ) pe second
D In c es with myocardial insuffi i ncy give about 1 cc (15 ℳ) pe minut (12 15 drops per minute) N ver give over 75 cc (2½ oz) in 1 hour e pt in tr tment of hock

COMPLICATIONS OF TRANSFUSION

T an fusion R tion

Tran fusion hould be stopped imm di tely if pati nt omplains of chills generalized tingling na tion, a vere anxiety p cordial oppr ssion pain in b ck of neck thorax and lumbar area or s nse of fullness of the head

A H m lyti R action Most seve of all and may be f tal Symptoms m nt on d above usually appear during the t ansfusion

or immediately afterward Hemolytic reactions are almost always ca sed by incompatibility of blood

B Allergic Reacti ns Usually occur following transfusion.
  1 Mild form Urticaria angioneurotic edema and eosino philia
  2 More severe form Difficulty of breathing asthmatic at tacks fatal anaphylaxis may occur

C Ch mical R actions (Pyrogens) Most ommon reactions Re a tion usually occurs 15 min tes to 1 hour after transfusion Chara terized by chills or rigor followed by fever

Tre tm nt of Transf sion R a tion

A H molytic R actions
  1 Ration le To attempt to p e ent the precipitation of acid hematin in the renal tubules Therefore alkalinization of urine and forcing of fluids is important
  2 *Definitive measures*
    a Give 10 Gm (150 gr) sodium bicarbonate orally at once and every 4 hours If patient is unable to oid 10 20 Gm (150 300 gr) sodium bicarbonate (specially p e pared see page 24) in 100 cc of distilled water I V or 500 1000 c (1 2 pt) of M/6 sodium lactate I V Re peat the dose in 8 hours or sooner if the urine becomes acid
    b Collect all urines and examin for hemoglobin Contin e alkalinization until no f rther hemoglobin is present
    c Supply fluids orally or by pa enter l means to maintain urin volume of at least 1500 c (1½ qt) per 24 ho rs as long as renal function is normal (S e acute renal failure page 303)
    d In severe or repeated hemolytic rea tions wh re re peated transfusions may be necessary corticotropin (ACTH) or cortisone is indicated (see p ge 423)

B All rgic Re ctions Treat as a y allergic re ction
  1 Give 0 2 0 5 cc (3 8 ♏) of epinephrine (adrenaline) 1 1000 subcut at once
  2 If symptoms persist may try antihistaminics (see page 66)

C Ch mical Rea tions
  1 During chill keep patient warm by adding blankets and hot water bottles This is usually all that is r quired
  2 However since the differ ntial diagnosis from the allergic reaction is often impossible give epinephrine (adrenaline) 1 1000 0 2 0 5 cc (3 8 ♏) subcut as soon as possible

Chapter 10

DISFASES OF THE GASTROINTESTINAL SYSTEM

NONSPECIFIC GASTROINTESTINAL SYMPTOMS

HALITOSIS (Bad Breath) (code No 619)

Halitosis an s lt f m many cau and tr atm t is d rect d at moval or r cti of th

T tm t

A Corr t ah o m lti g of r l hygie if p s nt

B T t E l t g D s

1 Chron n i d s s d se
2 Dent l ca ies gum infe ti ns to llar inf t o s etc
3 Sy t mic dis s f ers and toxemi
4 Ch oni pulmon ry di se g lung b c s
5 Gast int tin l dis a t any l l of th GI t t
6 N urop y hi t i diso d s wh e only th subje ti c m plaint of 'bad b th is p t

C Elimi ai Oll di g F d F om th Di t

1 G li and ns
2 Ri h g ea y foods if th y r th known cau

SOUR STOMACH (Pyrosis)

R l out sp cifi a s Cons der p ially d e s s of low r oph gu t ma h o biliary t act

Treatm t

A Drug

1 An id These dr g (see p ge 264) oft ffecti e n l g ou stomach although it i not f lt that th relief s obt in d i n cessarily depe de t upon the tr li tion of the gast i hydrochloric acid
2 S d ti es A ti paamodi medi tion (e p g 266)

B Pl d D t (See p g 52)

NAUSEA AND VOMITING
(Nausea code No 611) (Vomiti g code No 614)

These symptoms may oc ur ingly or concurre tly and may be

due to a *wide variety* of psychic reflex or central causes

A *Psychic Causes* These are variable and may have either a superficial or deep seated basis

B *Reflex Causes* Disturbances of various gastrointestinal structures and other viscera are capable of *exciting the vomiting center* Correction of this type of vomiting *is therefore dependent upon removal or alteration of these reflex disturbances*

1. Irritation inflammation or mechanical disturbances at any level of gastrointestinal tract (from pharynx to rectum)
2. Irritating impulses arising in any diseased viscera e g *cholecystitis*
3. Disturbances of semi circular canals e g seasickness
4. Toxic action of cardiac drugs e g digitalis

C Central (Vomiting Center) Causes

1. Central emetics Emetine apomorphine morphine
2. Exogenous and endogenous toxins
3. Increased intracranial pressure
4. Cerebral hypoxia Cerebral anemia or hemorrhage

Treatment,

A Acute, Simple acute vomiting such as occurs following dietary indiscretion or as experienced in the morning sickness of early pregnancy may require little or no treatment When necessary treatment consists of prescribing simple tolerated foods and occasionally mild sedative and antispasmodic drugs

B Prolonged *Severe or prolonged nausea and vomiting requires* careful medical management Specific causes must be corrected or eliminated The following general measures may be utilized as adjuncts to specific medical or surgical measures

1. *Fluids and nutrition* Maintain hydration and nutrition Withhold foods by mouth temporarily Administer 5 10% glucose in saline or water I V in quantities sufficient to maintain adequate hydration When oral feedings are resumed commence with dry foods in small quantities e g salted crackers Graham crackers etc With morning sickness these foods may best be taken before arising Later change to frequent small feedings of simple palatable foods Hot beverages tea and clear broths and cold beverages iced tea and carbonated liquids (especially ginger ale) are tolerated quite early Avoid lukewarm beverages Always consider patient s food preferences
2. *Drugs*
   a. Sedative antispasmodic drugs may be of value (see page 266)
   b. Ethyl aminobenzoate (benzocaine) 0 2 Gm (3 gr) with phenobarbital 20 mg (1/3 gr) every 4 6 hours p r n
   c. Chlorobutanol U S P Chlorbutol B P 0 3 Gm (5 gr) every 4 hours as needed
   d. Chlorpromazine hydrochloride (Thorazine®) has been introduced recently for the control of nausea and vomiting due to a wide variety of causes The drug is administered deeply I M in doses of 25 50 mg every 4 to 6 hours p r n or orally in doses of 10 50 mg every 4 to 6 hours p r n The effectiveness of the drug has not been completely established Hepatic damage with jaundice has

been r ported in a f w instan es The dr g is contra indi t d in p tient who are receiving la ge doses of C N S d p ssants

3 Psychothe py
  a Isol t on of pat ent is r comm ded Hospitaliz tion may be necessary Visiting should be strict d
  b Avo d unple sant psychic timuli ch as strang od rs foul smelling or foul ta ting med tion emes s basins or oth un ttract object as well as foods which are improperly p epared or served
  c Place pati t n a definit treatm nt program and let it b kn wn th t something is being don Hard boiled or brutal technic ar to be avoided
  d Att mpt t d t rmine the psy hodynam cs of the nau and vomiting but avoid agg essiv psychoth r py during t t phase of the illn ss

HICCUP (Singultus) (code No 671)

Hicc p although a common and u ually b nign symptom m y be a manifest t on f any one of many di ses It is important to rule out a wid vari ty of p cifi ca ses neu es C N S dis o ders pulmo ca diac disorders gastroint tin l di o d rs renal failur inf ctious dis a es and other disease

Tre tm t

T eatment of the specifi aus may suffi e to cl ar hiccup Howe er it is ually ne s ry to u e ce ta n n sp cific meas ures to p ovid r lief from this symptom Countless measur s h ve been s gg sted for b aking up the hythmi fl x All the e t atment me sures m y fail and th symptom may be so p ol ged and se e as to j op diz the pati t life

A Simpl Home Rem di Thes m asu es probably act by di rting th pati t s attention th y on ist f di t acting con ation fright p inf l o umpl asant stimuli or of having pati e t pe form app tly purp sel ss p oc du es (holding b ath, sipping ice wate inh ling t ong fume t)

B Drug and M di tion
  1 Sed t on Any f th a ious common sed ti d ugs m y be ff ctive Give P ntobarbital Sodium U S P P ntob rbi ton Sodium B P 0 1 Gm (1½ gr) orally or 0 13 Gm (2 gr) by rect l upposit ry
  2 An sthetic drug Loc l anestheti s g ocain may b applied to the n al mu ou m mb an or to the pharynx Gene al anesthesia may be t ied in so-called intractable cas s
  3 Antispasmodi s Atropine ulf t 0 3 0 6 mg (1/200 1/100 gr), may be given bcutaneously
  4 Amyl nit it inhal tions may be ffective
  5 C rbon dioxide H e patient eb eathe into a plain p pe bag for 3 to 5 minutes or admini ter 10-15% CO_2 mixture by f e mask f 3 to 5 minut

C. Surgic l M asure Various phr ic nerve ope ations includ ing b lat ral phre otomy m y be indicat d in certain extreme

cases which fail to respond to all other measures and which are considered to be a threat to life

CONSTIPATION (code No 630)

Eliminate specific causes of constipation first Rule out colonic or rectal lesions hypometabolism or psychogenic causes Be especially suspicious when there are sudden changes in bowel habits without apparent cause Inadequate fluids and low residue diets may have a constipating effect The following commonly used drugs which the patient may be rec iving for an unrelated illness may cause constipation b lladonna and derivatives narcotic drugs bismuth salts *calcium salts aluminum hydroxide gels (Amphojel®)* aluminum phosphate gels (Phosphojel®) and iron salts

Treatm nt

A Correct Patient s Attitude Toward Elimination
  1 A daily bowel mo ement is not essential to normal health or well being There is normally consid rable i dividual vari ation in the frequency of bowel movements
  2 So called auto intoxication theories are unfounded
  3 Constipation particularly for short periods is seldom cause for alarm
  4 *Many symptoms (e g lack of 'pep) attributed* to constip tion have no such relationship
  5 Periodic purgation serves no tonic purpose

B Re establishment of Regular Evacuation
  1 *The gastro colic reflex should be utilized to optimal ad* vantage by having patient set aside a regular daily period aft r a meal (preferably breakfast) for a bowel movement even when the urge to defecate is not present This is based physiologically on the primitive reflex wherein distention of the stomach by food sets off a reflex evacuation of the colon Explanation of the reflex evacuation as it occurs in infants after feedings appeals to many patients Emphasize the f ct that this normal reflex is perverted or lost by personal habits or social customs
  2 Sufficient time must be allotted to permit a *leisurely* per formance of the act
     a Patient may alter his daily schedule to permit more time for bowel movements
     b Relaxation may be aided by re ding a book etc while sitting on the toilet
  3 Cathartl s and enemata should *never* be employed without direct advice or s pervision of a physician if patient e er ex pects seriously to correct his constipation since these mea sures interfere with the normal bowel refle es For psycho logical reasons if not physiological it is somet me inad visable to discontinue such m asures suddenly if patient has employed them for a prolonged per od of time It may be better to compromise temporarily with intermediate m a sures of bland laxatives and mild enemata (see n xt b ge) Chronic cathartic and enemata addicts often defy all medical *measures and their treatment* is espe ially hopeless when

there a i s u derlying psychiatr dist b es

C Di t In g eral the di t m y be p of t bly modif ed to ati fy the f ll wi g r qui m t (pag 52)

1 Ad qu t volume Oft n on t pation s merely du to in d qu t f od i take
2 Ad quat bulk or du Thi doe not n ssarily imply ro gh g ch as bra Smooth or bland food m y b pr f r d in pa ti corst pation
3 V g t bl ritants U l ss th is p cifi ont aindi t on (e g int le) t wed or r w f its or getabl may be of v l i many e f chron c con tip tion spe ially the so c lled t i type
4 Ad quat fluids Th p ti t should be o g d to d ink d qu t o la g quantit es of fl ids so that incre d water is vail ble in th int tinal tract f pas ge of i t t l o t t
   a Si to 8 gl f fl id pe d y i dd t t fl id on te t f food a din ily sufficie t
   b Th t m h o ed gl s of hot w t r tak a half hou be fore b eakf t ms to e ert a mild l ti e ff t

D E rci Moderate phy i l e ci e adjust d to individ l ds and p bil ti s i s nti l Bed p ti t m y p of t by active and pa i is s Good ton f th t rnal abdom i l m s l s is import nt Co tiv phy i l th py m y b mployed in p ti nts w th pt t bdome

E M di t on

1 Bland lax tiv s *The e a ent h ld be em l ed t mporarily during th bowel training (re-educat on) program or as a n ront e measure in lo g st r ing athart o r i enera t ddi a h y are r ver thte ded a a substitute f r a careful bowel trai ing program ey sh uld be withdrawn a oo n the n tipation im roves*
   Liquid P t ol t m U S P Liq d Pa affin B P (min l oil) 15 30 (½ 1) l 2 tim s da ly p r n
   b Ag U S P B P w th min l oil 15 30 c (½ 1 oz) l 2 tim s d ily p
   Do t u e m n ral il over prolonge periods sin it int rf es w th bs rption of foodst ffs partic l rly f t s l bl vi mins Th is l som isk of lipoi l pne monia, ven f m it r l
   Oli O l U S P B P 15 30 (½ l o) l 2 tim da ly p n
   d V getabl m ilage e g P ylli m Hyd ophili M ill d with D xtros N N R (Met m il®) l 3 tsp b i d t t i d p c mi ed in full gl s of w t
   C ca a S grada Arom tic Fl id Extract U S P El of C scar S gr da B P 4 8 c (l 2 d) h s y night
   f M gne ium M gm U S P M t e of M gn i m Hyd ide B P (milk of magnesia) 15 30 c (½ l oz) h s ry ight
   g Sodi m Phosph te U S P B P (d od m phosphat) 4 8 Gm (l 2 d) in hot w t r befor b akf t
2 Sedativ s (Se page 35)

7 Reflex from other viscera — Pelvic pathology (extrinsic to GI tract)
8 Neurologic disease — Tabes dorsalis
9 Metabolic disease — Hyperthyroidism

Treatment

A Eliminate the specific cause, whenever possible

B Co rect I hysiological Changes Induced by Diarrhea In addition to necessity for control of intestinal hyperperistalsis it is essential that the following secondary or complicating features be treated
   1 Fluid imbalance (dehydration) (see page 10)
   2 Mineral imbalance e g hypocalcemia (see page 380)
   3 Nutritional disturbances e g hypoproteinemia (see page 56) and deficiencies (see pages 58 64)
   4 *Psychogenic disturbances* e g fixation on GI tract or anxiety regarding sphincter mishaps in cases of long standing diarrhea

C Diet,
   1 Non irritant foods Many clinicians feel that food should be withheld or that the intake during the first 24 hours should be restricted to liquid foods (See bacillary dysentery page 276) During the *acute* phase of enteritis the only foods which should be taken by mouth are the following very bland items water weak tea rice or barley gruel meat broth precooked cereals toasted bread or soda crackers with butter and soft cooked (not fried) eggs These foods are usually administered in about that same order as tolerated
   2 Bland foods (never highly spiced or seasoned) These foods should be incorporated in the diets of patients *convalescing* from acute diarrhea or with *chronic* diarrhea They include in addition to the non irritant foods the following items cereals with milk or cream strained broths and soups bland cheeses fish fowl and meats (not fried) potatoes (not fried) breads milk products eggs and food beverages (not carbonated)
   3 *Avoid Vegetables and fruits (especially raw) fried foods bran whole grain cereals Jams jellies preserves syrups and candies pickles relishes and spices coffee carbonated and alcoholic beverages*
   4 Supplementary vitamins The bland diet is a restricted di t and may further increase the vitamin deficiency induced by altered intestinal absorption Patients with chronic diarrhea should probably receive vitamins in dosages comparable to those used for chronic vitamin deficiency states Roughly this amount may vary from 4 to 10 times the normal maintenance dose (see page 56)

D Anti diarrh al Agents
   1 Bismuth preparations These may be used for either acute *or chronic diarrheas*
      a Bismuth Subcarbonate U S P B P 1 2 Gm (15 30 gr) after liquid bowel movements or q i d
      b Milk of Bismuth N F (bismuth hydroxide and s bcarbonate) 4 cc (1 tsp) after liquid bowel movements or q i d

c ℞ Bismuth a bcarbonate 15 30 0 ℥ss i
Camphorated tinctur of
opium (pareg r c) q s ad 120 0 ℥i
Shake well
Sig 4 cc (1 t p) aft liquid bowel movem ts or q i d

d Milk of bismuth and parego ic (eq al amounts of each) m y b substituted fo the abov mixture using th s m dose

e ℞ Belladonna extr ct 0 5 gr viiss
Bi muth subcarbonate
C lcium l ctate
Kaolin āā 30 0 ℥i
P ppe mint oil 2 drop gtt ii
Sig 4 (1 t p) t i d a c a d h s or after liquid bow l mov ments p r n (modified afte Bockus)

2 Pectin kaolin compounds Th se are availabl and are use ful mixtures Dose 15 30 c (½ 1 oz) t i d a c and h s or aft liquid bow l mo ements p r n

3 Albumin Tannate U S P This drug h s be n recomme d d s an djun t t othe m sur s when di charg s ar profuse Dos 2 Gm (30 gr) t i d a c and h s or after liquid bow l mo ements p r n

4 Opiat s Opi tes m t be avoid d in chronic dia rheas and ar p ferably avoided in acute diarrh s unl ss there is in t act ble diarrhea vomiting and coli Alw ys lud the possibility of t su gi al bdominal dis ase befo e ad ministeri g opi te

a Camphorat d Tin ture of Opi m U S P B P (pare g ri) 4 8 cc (1 2 dr) after liquid bow l mo m nts p r n or pr sc ibed in combination with bi muth (above)

b Cod in Ph phat 15 65 mg (¼ 1 gr) subc t after liquid bow l mo em ts p r n

5 St ong opi t s Morphine and Dil udid® should be r serv d fo s l ct d p tients with acute se e e diar h who fail to r spond to more conservative m a ure

a Morphine ulf te 8 15 mg (⅛ ¼ gr) subcut afte liquid bowel mov m nts p r n This drug may produce n us a and vomiting

b Dilaudid® M y be substit t d fo morphine if th unde si abl sid eff cts of m rphin r to be avoid d. Do 2 3 mg (1/32 1/20 gr) I M aft liquid bow l move m ts p r n

6 Anti pasmodic and edative drugs (e pag 266) Th anti pasmodic drugs particularly when u ed in ombination with the b rbitur t exert a f vorable and mild antiperistalti action It may be n cessary at times to administer the var ious bell donna or belladonna like alkaloids to a point f toxi ity in o der to achieve th d sir d effect Anti pa modi s dative drug m y be onsider d the agents of choi e in th treatm nt of chronic di rrh s associ ted with anxi ty tension stat

7 Digestant drugs Hydrochloric acid pa cre tin, and bil s lts at times give definit non pecifi eli f Wh the is demon t abl defi i cy of the e ubst nces eplac ment the apy is more striking (See spe ifi dis a)

Treatm nt

There is no satisfactory treatment for carcinoma of the esoph agus

A Diet. Soft or liquid food should be given as tolerated gastros tomy feedings may be given in selected cases
B Surgical Removal This is reserved for the few who have no demonstrable metastases and are good surgical risks
C Deep Radiation Therapy This may be employed in selected cases when surgery is not feasible
D Morphine s lfate or other suitable analgesic agents should be administered as necessary for relief of chronic pain especially in terminal cases (see page 37)

CARDIOSPASM (code No 641)

Spasm of the lower end of the esophagus may be due to local or reflex causes Dysphagia epigastric pain and regurgitation of un digested foods are the most common findings X rays reveal dila tation above the site of obstruction

Treatm nt

A Soft or liquid food as tolerated
B Autonomic drugs have been employed with variable and non spectacular results Large doses of parenteral antispasmodics are often ineffective Recent experimental and clinical studies suggest that the sympatholytic agents may be effecti e (see page 266)
C Mechanical dilatation of the cardia by graduated bougies may be necessary

DISEASES OF THE STOMACH AND DUODENUM

PEPTIC ULCER
(Gastric code No 640 951) (Duodenal code No 651 951)

An acute or chronic ulceration of any portion of the GI tract which may be exposed to the action of acid juices Lesions may occur at any point in the lower esophagus stomach upper duod num (most common) gastroenterostomy margins and in certain anomalous areas of the GI tract (e g Meckel s diverticulum) The ulceration may be simple or complicated by hemorrhage perfora tion scarring and obstruction or by malignancy

Di g osis

May be based upon

A History
1 Pain Classically there is postprandial (1 2 hours) or fast ing epigastric discomfort burning or pain usually relieved by bland foods and/or alkalies
2 Other symptoms Nausea vomiting flatulence distention hematemesis and melena

B Physical Findings Often local tenderness in the epigastrium

C Laboratory Findings Ther m y be
 1 Abundant or ce ive fre HCl in gast i juice both with and without histamin injection
 2 Gros or occult blood in tools

D X ray Evid nc of Ulceration Based upon films and flu oscopy of GI erie Ul activity is usually indic t d by pre enc of niche or irr gularity of mucosal contour but ometimes evi dence is indirect such s alte ed peristalsis pyloro p sm ga tri rete tion o pe sistent d form ty R peated GI seri s may be n ces ary to demon tr te active ulceration in certain cases

E G st o copi d mo t ti of ul er ater

Diagn stic Crite ia

A It is not d i able t mak a diagnosi of peptic ulcer unl s there is has been x ray o g stros opic evid n e of ulce

B In fac of clear cut pepti ulc r history without labor tory con firm tion it m y b nec sary t times to perf m ep ted GI e ies

C Malignant di eas should be su pected when the f llowing find ings a e pr s nt
 1 Location The lesion i loc t d in the stoma h parti ularly if in the p epyloric r gion high on the les er ur tu o if on th gre te curvature
 2 Dur tion of ymptoms is short (no previous symptoms)
 3 Ag of the patient is more than 40 y e
 4 F llure f r spons The e is failure of lini al and x ay r sponse after not le than 3 and not m e than 4 we ks of i tensive m di al the apy (s e b low)

ACUTE PHASE

T e tm t

A Ge al M asu s
 1 R t (phy ical and m tal) Th patient should ha 2 or 3 w eks rest f om work if p ssible pr fer bly in bed If th hom situation is um tisfactory or unpl sant or if oope ation of the patient is unsatisf ctory hospitaliz tion is re omm nd d If pati nt financ s a e limited it may be ecessa y f r him to continue wo k d ing t e tment In such a es it is s ential that he be giv n aref l inst uctions r garding th carrying out of th m di al pr gram und th gi en w king conditions When possibl arrangements should be m de fo est periods in rea ed hou of sleep and f r any oth r f t rs whi h need to be modified in th p ti t s home or working vironm nt
 2 Ori tation Th pati nt should be dvis d as to the chroni recurrent nature as well as t the pot tialiti of the di ease Do not emphasiz cancer as a omplic tion of th disease
 3 P ychotherapy Anxiety p oducing mechanism should be relieved whe ve possibl It is not usually wise to insti tute active p y hotherapy duri g th cute ph se of the ill nes (e pag 41)
 4 Al ohol and toba co must be voided

5 Avoidance of certain drugs [e g corticotropin (ACTH) and cortisone] Recrudescence of symptoms and even perforation and hemorrhage have been observed *to occur in patients* with peptic ulcer during the course of administration of corticotropin (ACTH) and cortisone This hazard should always be considered The mechanism is unknown

B Diet

1 Sippy diets A wide variety of diets are available but the Sippy diets or modifications of these are probably the most effective (see page 52) The patient should learn the principles of his diet and should be taught to be careful of his *diet* for the remainder of his life Rich spicy hot and coarse particle foods should be excluded from the diet permanently Regularity of meals and proper mental attitude during meals should be emphasized as essential for success*ful results from diet The length of time* the patient should remain on each phase of the diet will depend on numerous factors namely

a Severity of symptoms
b Treatment situation *e g Sippy I diet does not meet the* nutritional requirements of the hard laborer Additional food is essential.
c Intelligence and cooperativeness of the patient
d Response to treatment

2 Avoid short cuts In general most of the short cut or so-called modified methods do not ultimately save the patient time In many cases they not only fail to provide the necessary relief of symptoms but also actually serve to lengthen the period of convalescence The psychological importance of a strict dietary regimen in the acute phase is of great importance to peptic ulcer patients especially to new patients since these patients will otherwise fail to *recognize the importance of diet in the long term care of* their disease Patients on short cut diets become sloppy and lackadaisical and indifferent to the potentially serious nature of their illness Unfortunately there is no unanimity of opinion among clinicians regarding the matter of diet in peptic ulcer

3 Protein hydrolysates The status of protein hydrolysates in the treatment of peptic ulcer is at present unsettled Reputed advantages of the amino acids are that they have a high buffering activity and relieve hypoproteinemia as well as causing prompt healing of the ulcer Antacids are not ordinarily employed with the amino acid regimen The method is stated to be of special value in hemorrhage due to peptic ulcer

4 Restrictions Meat extracts bran raw vegetables and fruits fried foods condiments spices alcohol coffee tea and carbonated beverages

C Drug

1 Antacids It is difficult to state which of the many antacids available are most effective since in certain circumstances each of the agents listed below enjoys special advantages In general adherence to a suitabl dietary regimen will decrease the need for excessive and prolonged use *of antacids*

All patients on antacid therapy should be watched for diarrhea constipation alkalosis and fecal imp ction

Ant id powd s are p scribed on va iou s hed l s according to th stage of the d et During the rly stag of the Sippy reg me the powd s a g ven on alte n te ho rs o half hours during the day and ev n t night if n c ssary Th interval between powd rs m y then be le gth ned a cording to linical and x ray evid nce f imp vem nt For m p olonged u th powd s a e usually dminist ed 2 hours p c and p r n Magn ium o d i a l xati drug and calcium carbonat tends to produce constipation

a Magnesium Oxide U S P B P and Cal i m Carbonat U S P B P

℞ Magnesium oxide 30 60 0 ℥ ii
Cal ium carbonat q s ad 120 0 ℥iv

Sig Take ½ 1 tsp in half glass of wat r a directed By varying the m gn sium xide in the abov powder th laxative onstipating ffect of th 2 ing dient may be effectively balanced This powder may b given in altern t doses with the aluminum hydro ide gel (see below)

b M Bi Cal (magne ium bi muth c lcium) mixt re

℞ Magn sium oxide 20 60 0 ℥v ii
Bismuth s b rbonate 20 0 ℥
C lcium carbon te q s ad 120 0 ℥iv

Sig ½ 1 tsp in half glas of wate s di cted Th bi muth is incorpo ted be ause of its oothing oat ing eff ct thi powder occasionally offers reli f whe th magnesium o ide lcium arbonat powd r fails to re liev

c Magn sium T isilicate U S P B P ½ 1 tsp in half glas of wate as directed An e c llent non systemi antacid with unusual protecti e properties

d Aluminum Hydro id G l, U S P (Amphojel® C amalin® tc) Th s ge ts have recently joyed popular us be c u e of conveni nce of administ ation r lati freedom f om induction of alkal is and be ause of local dso b ent protective and d mul t ction How ver th y re constipating interf with phosphat and vitamin absorp tion, m y r quire la ge doses and oc asionally fail to give lief

(1) Aluminum hydroxid gel, liquid 1 2 tsp in half gla of w t r v ry 2 4 hours p r n
(2) Al minum hydroxide gel (dri d) tablet chew 1 2 tab lets and follow with half glas of w ter eve y 2 4 hour p r n. These tabl ts are espe ially conve i t f patients who are forced to continue w rk o to travel
(3) Aluminum hyd oxide g l m gnesium tri ili te mix ture liquid (Gelusil® T i easmalate® et), 1 2 tsp in half gl s of wate eve y 2 4 hours p r n The ad dition of magnesium trisilicate in eas the neutral izing pow and prot ctive coating action of the alumi num hydroxide gel This mixtur is lso le onsti pating

(4) Aluminum hydroxide gel (dried) magnesium trisilicate tablets chew 1 or 2 tablets every 2 4 hours p r n and follow with a half glass of water

2 Sedative drugs The use of sedative drugs will depend on the emotional status of the patient Tense and apprehensive pa tients will usually profit greatly from proper sedation Most patients with peptic ulcer profit by sedative drugs The barbiturates are the *preferred sedatives* *They may be used* alone or in combination with antispasmodic drugs Hypnotic doses of the barbiturates may be necessary to insure sleep during the acute phase of the ulcer (see page 35)

3 Antispasmodic drugs Any of the following drugs or mixtures may be employed for their antispasmodic and sedative effects

a ℞ Tincture of belladonna 10 30 0 ʒiiss ʒi
   Elixir of phenobarbital q s ad 120 0 ʒiv
   Sig 1 tsp in half glass of water t i d 20 30 minutes a c and h s p r n

b ℞ Belladonna extract 8 15 mg gr 1/8 1/4
   Phenobarbital 15 mg gr 1/4
   Sig 1 tablet t i d 20 30 minutes a c and h s p r n

c Tincture of Belladonna, U S P B P 0 3 0 6 cc (5 10 drops) in half a glass of water orally t i d 20 30 min utes a c and h s p r n (0 6 cc of the tincture equals about 0 2 mg of atropine) This preparation permits rather delicate titration of desired antispasmodic effect by simply regulating the number of drops

d Belladonna Extract U S P B P 8 15 mg (1/8 1/4 gr) tablets or capsules orally t i d 20 30 minutes a c and h s p r n (15 mg equals about 0 2 mg atropine alkaloid)

e Atropine Sulfate U S P B P 0 4 0 6 mg (1/150 1/100 gr) 1 tablet t i d 30 minutes a c and h s p r n

f Trasentine® (N C A) 75 mg (1 1/4 gr) t i d 20 30 min utes a c and h s p r n Acts principally on smooth muscles and has few of the side effects of the belladonna preparations but also has less antispasmodic effect Usually prescribed in combination with phenobarbital Stated to have a local anesthetic effect on mucous mem branes

   ℞ Trasentine® 0 050 gr 3/4
   Phenobarbital 0 020 gr 1/3
   Sig 1 tablet t i d 30 minutes a c and h s p r n

g Methantheline bromide (Banthine®) and the more recently introduced propantheline bromide (Pro Banthine®) have been reported to provide effective control of hypermotility and hyperacidity in patients with peptic ulcer Although these are potent anticholinergic drugs adjunctive mea sures of diet rest and antacids are often necessary for control of symptoms of many ulcer patients Methantheline is employed in doses of 50 100 mg (3/4 1 1/2 gr) t i d q i d *propantheline is given in doses of 15 30 mg* (1/4 1/2 gr) t i d q i d

h Diphenmethanil methylsulfate (Prantal®) is reported to e rt significant antispasmod c anticholinergic eff cts in peptic ulcer patients when used in dosages of 100 200 mg

(1½ 3 gr) t i d q i d

f Oxyphenonium bromide (Antrenyl®) is ported to be a potent anti holinergi gent for tr tment of peptic ul er Dosage f 10 mg (⅙ gr) q i d for the first week m in te ance dosage th reafter is reduced to the point of con t ol of symptoms

CONVALESCENT PHASE

Tr tme t

A R min tion When clini al qui sc nce of the lesion is evi d nt (based on f eedom f om sympt m) a repeat GI x ray seri s is advi abl to det rmine wh th or not the e is roent gen vid nc f healing of the ul e In the cas of gastric le sions failure of clinical improvem t and x r y imp o ement of the ulcer cr te within a period of 3 4 we k on a c eful medical regim n should be taken as a spicious evidence of gastri malignancy

B Ed ation of Pati nt R ga ding R cur n

1 Th pati t h ld b ed ated t an under tanding of th hronicity and r ur ent pot tialities of hi ailment as w ll as of th dange s d to omplications whi h may f l low neglectful o imp op t eatment

2 Fact s ausing r urr n s It should be empha ized t the patient that the following f ctors a most frequ ntly e sponsible f e urr nce of ulc

a Imprope d et and ir egular eating habits

b Irregular li ing habits long o irregul hours

Us of alcohol or tob cco

d Emotional stres

e Inf ction particularly of the upper pirat ry t a t

3 Man g m t P ti t should be inst uct d to turn to the Sippy r gim n or t modifi tion the f in th nt of e ur en e f symptoms o ve p ophylacti ally if th y ar expos d to onditions known to ggr te pepti ul In addition to di t inf mat on anta id and oth m di ation should be r adily av ilable to the p tient

C R t and R e tion P vi ions hould be m d fo p ope re t r cr ation va tions and the like to p mot phy ical and ment l t ation

D P y hoth py S l t d p ti nts should b onsid d f in t ns ve o p long d psy hoth apy

TREATMENT OF COMPLICATIONS

INTRACTABILITY TO TREATMENT

Although num ous ca s undoubt d y i t wher benign pepti ul ers f il t heal de pit compet t medi l upervision it is probabl that most es of st bborn and per i t nt l a fl ction of a inad quate medi al r gim n of p rtial or ompl f il re of coope ation on the part of the patient Th f tor p viously me tion d as being pon ible for u enc of pepti ulc r are oft the ame f ct s whi h int fers with th he

of ulcers The designation intractable should be reserved only for those patients who have been given adequate and supervised trial of therapy The possibility of *malignancy or of other complications* of the ulcer (e g pyloric obstruction perforation gastritis etc) must always be considered

HEMORRHAGE

(Stomach code No 640 951 7) (Duodenum code No 651 951 7)

Although peptic ulceration accounts for about 70% of gross hemorrhage from the upper gastrointestinal tract one must bear in mind the possibility of esophageal varices gastritis duodenitis carcinoma of the stomach *hiatus hernia* and *bleeding diseases*

Treatment

A Emergency Measures for Hemorrhage and Shock

Refer to page 3 for general management of shock

1 Hospitalize patient at absolute bed rest
2 Warmth Keep patient comfortable If an ice bag is applied to the epigastrium avoid chilling the patient
3 Treatment of apprehension and anxiety
   a Reassurance by word and manner of physician that the condition is not critical
   b Rest *Provide prompt mental and physical rest* this can best be achieved in the hospital
   c Sedation May be necessary
      (1) Morphine should be avoided if possible since *it may cause nausea* Dose is 12 16 mg (1/6 1/4 gr) subcut every 4 6 hours It is best to substitute codeine phosphate 30 65 mg (1/2 1 gr) subcut or orally or Dilaudid® 4 mg (1/16 gr) subcut every 4 6 hours p r n
      (2) Sodium phenobarbital (sodium phenobarbitone) 0 03 0 1 Gm (1/2 1 1/2 gr) subcut or orally during the first 24 48 hours
      (3) Phenobarbital (phenobarbitone) may be continued for several days if necessary
4 Oxygen Preferably by mask at 5 10 liters per minute (see page 147)
5 Transfusions There has been considerable controversy regarding the use of *blood transfusions in bleeding ulcer* However it is generally agreed that the previous conservative attitude (fear that transfusion may raise the fallen blood pressure to a point causing recurrence of hemorrhage) is not warranted Certainly in severe hemorrhage the time rate and volume of blood administration should suit the physiological needs and larg amounts of blood may be given when indicated Transfusions must *always* be given if hemorrhage is severe (Hgb < 50% or RBC < 2 5 million) if immediate surgery is contemplated or if symptoms of anoxia or shock are not rapidly controlled Slow and continuous administration of 500 cc up to 2500 cc of whole blood daily may be necessary
6 Clinical and laboratory studies

a Take pulse respir tions and blood pressure ev ry 1/2 1 hour sin the d ta may giv information r garding shock status in advan e of blood chang
b Observe all vomitus and stools for gr ss o occult blood
c Type and c os m tch th patient s blood carefully as soon as possible Have whole blood or plasma available witho t delay
d Obtain mpl t blood count and hemat rit initially and s rially as indicated
e Obtain blood N P N o ur a nitrogen for omparison with later studies

B G 1 M s

1 Co e t dehydr tion and s lt depletion
  a Hypod moclysis Physiologic salin solution 1 0 1 5 liters daily by this m thod
  b Oral liquid feedings as soon as t le ated (ee below)
  c Sodium chlorid 3 6 Gm (3/4 1 1/2 dr) may be dded to each lit of liquid food mixture to p event salt depl tion
2 Nut ition
  a Starvation The policy of initial starvation is subject t con iderable controve y Sin e th patient is oft n nauseat d and anorexic or even in shock on th first d y food m y be saf ly withh ld
  b Fl id If pati t is n u eated o vomiting thirst may be cont olled by fluids given parenterally The p ti nt may be permitted to dissolve i hip or h rd fruit fla or d andy under the tongue to relieve thi st
  c Di t If the patie t is hungry and not vomiting it is wise to begin immediat dmini tr tion of bland foodstuff
    (1) Liquid di t It is best to begin with a liquid diet of hourly f edings of milk and c am mixture (s e pag 53), using supplem ntary anta id powders Th ee to 6 Gm (3/4 1 1/2 d) of sodium chlorid may be add d to ach quart of milk c eam mixture to p eve t s lt depletion
    (2) Solid bland foods
      ( ) Con ervative approa h Solid bland food may be added whe the patient has shown apparent clinical imp ovement on the liquid (milk and cream) gi men within 1 2 weeks and when the patient s tools ha e shown no occult blood for 2 3 days
      (b) Liberal approach (g M ul gra ht) This meth od permits imm diate feeding of all on ir itant high caloric foods but in pur ed f rm

C Convalescent Care. Following the acute episode the cons rva tive m dical regimen, such as outlined for uncompli at d peptic ulcer (s e page 263) should be instit t d.

D S g y S gery should be considered if
1 The general condition of the patient fail to improve despit the above measures
2 Bleeding persist as videnced by gros o occult blood in tool If the patient s ondition permits g strointestinal ay s iss hould be performed to help localize the sou e of identify the character of the bl ding lesion Manipulation du ing such examinations should be as g tle as pos ibl If

esophageal varices are eliminated as a cause of bleeding and the bleeding persists for more than 2 3 weeks prepare the patient promptly for surgical intervention Do not wait until *the patient becomes a poor operative risk* before making this decision

PYLORIC OBSTRUCTION (code No 618)

It is important to differentiate pyloric obstruction due to spasm and edema from that due to scarring The former condition may respond to medical treatment whereas the obstruction due to scarring is a surgical problem

Tre tm t

A M dical M asures *(for obstruction due to spasm or edema)*
1 Bed rest preferably in the hospital
2 Liberal use of antispasmodics
a Oral If patient is able to retain oral medication
(1) Tincture of belladonna 10 20 drops t i d or q i d
or (2) Belladonna extract 15 mg (1/4 gr) t i d or q i d
b Parenteral If the patient is unable to retain medication by mouth atropine sulfate 0 3 0 6 mg (1/200 1/100 gr) t i d or q i d subcutaneously
3 Sedatives
a Phenobarbital (phenobarbitone) 15 30 mg (1/4 1/2 gr) t i d q i d
or b Phenobarbital sodium (phenobarbitone sodium) 0 065 Gm (1 gr) subcut every 8 12 hours p r n
4 Nutrition
a Sippy I diet should be used initially gradually progressing to Sippy II III and IV as tolerated (see page 52)
b Fluid or mineral imbalance must be corrected if vomiting is severe or prolonged Parenteral methods are most satisfactory (see pages 10 and 27)
c Hypoproteinemia must be corrected since the resultant edema may increase pylorospasm
5 Control of hyperacidity
a Gastric secretions should be aspirated e ery morning and night with a small gastric tube Some clinicians f el that *continuous gastric suction should be employed initially*
b Antacids may be employed as for treatment of uncomplicated ulcer (see page 264) but *avoid* alkalosis from excessive use of soluble antacids since this increases pylorospasm

B Surgical Measures (for obstruction due to scarring)
1 Surg ry is to be employed only when a thorough trial of conservative measures has failed
2 The various recommended surgical procedures will not be discussed It is currently the practice to perform gastric resection in most cases although some surgeons favor gastroenterostomy

PERFORATION DUE TO ULCER

(Stomach code No 640 951 3) (Duodenum code No 651 951 3)

A ute b cut and h oni perfo tion of peptic ulc s may cc Acute pe fo ti co stit t s a medic l m g cy Imme diat u gical repair p fe ably by simple s gi al clo ure is in d ated Mo e t nsi op rat ns re gene ally unwis at the time of the acut pis d b aus of the in r ed ope ati hazard due t the pat nts usually poo phys c l ondition If th patient has b n r c iving ACTH or tis n the py th d ugs must be imm diat ly dis ontin d If th p t t has h d no pr vious th r py o if p i u th apy has be n nadequat he may then be plac d upon a con ti m di l g m If th p ti nt has had an ad quat t ial of th apy p ior to the pisod pr p him fo pos ibl furth r t n i p ati p oced r s by t fusions and oth s pp rti e me su es Th t atment of s ba ut or hronic pe f ation may be m dic l u gical d pendi g upo th pre nc o b n e of mpl cat o s (g ab es t vol m nt f neighbo ing vis e) o pon th p t n nd s ty f ympt m

GASTRITIS (code No 640 3)

Th stoma h m y be m ut ly h on ally fl m d du to a wide vari ty of pe ifi and on pe ific g t itis a poo ly d fin d nd i bl It i ot n al to h an abs n of ympt m wh n p s t th y lo ly Th sympt m of ympt m of pepti ul mbl the

Physi al ami ation u ally t d ag t X r y f nding a e not ema kabl unl s th g t t mpli ted by at ophi hypert ophi c i

Ga t i id ty m y b d l g h on h ng triti and blood m y b ob s d i th h o i f m of g f c s G t os opi i ll ation m y ont ts and in th cosal hang whi h f m th ba fo l i l l t m g st iti P ti nt with pe ni i u mia who h if atio of t itis must be ob rved f lly and pe i di lly f at ophi ga malignant d g n ation of polyp ide of

T tm t

A G ral Measure A d t y and d g t atm nt p g m e enti lly imila t that mpl yed in pepti ul t us ful (s p g 284)

B Spe ifi M ggra s g f to (g inf t on lcohol tob) ti and

GASTRIC MALIGNANCY

(Carcinoma of the Stomach) (code No 640 8)

C rcinoma of the toma h houl l be pe t d ll pati ts ove 45 year of g who develop dyspep Th di s more ommonly in m than in wom n Le ion oc u ing region of the great r urvatu and p p l i malignant A high inde of uspi ion f l x y

studies and gastric analysis afford the greatest opportunity for early diagnosis Unfortunately by the time the disease is manifest me tastases usually have occurred and the lesion is no longer amenable to satisfactory surgical therapy

Treatment

A *Specific Treatment (corrective)* Early and thorough gastric resection is essential if the patient is a good operative risk Patients should be afforded the opportunity of corrective sur gery regardless of the apparently advanced nature of a malig nant lesion

B General M asures (palliative) To be considered only when correcti e surgery is impossible
   1 Simple shunting procedures (e g gastroenterostomy) in the event of pyloric obstruction
   2 Symptomatic and supportive treatment as indicated
   3 Narcotics should be given in adequate doses to alleviate suf fering (see page 37)

DIAPHRAGMATIC HERNIA
(Congenital code No 275 037 9) (Traumatic code No 274-424)

Herniation of a portion of the abdominal viscera through a con genital or acquired defect (especially esophageal hiatus) of the dia phragm may be manifested by a wide variety of symptoms but classically by epigastric distress and dyspepsia noted especially on lying down after meals Nausea vomiting, small hemorrhage *and angina like symptoms may occur X ray demonstration of the* hernia is usually necessary to confirm the diagnosis Small eso- phageal hiatus hernias which are of questionable clinical signifi cance are reported frequently (at least 10%) on routine x ray gastro- intestinal series

Treatment,

A Treat as for functional dyspepsia (see page 260)
   1 Small frequent feedings of bland easily tolerated food
   2 *Antispasmodic sedative medication (see page 266)*
   3 Antacid powders frequently provide relief from heartburn (see page 264)

B Instru tions to Patients
   1 Patient should be instructed to
      a Avoid lying down immediately after eating
      b Avoid exercising vigorously after eating
   2 Patient should be advised to sleep in the semi Fowler posi tion or at least with upper part of body slightly elevated in *an attempt to decrease acid regurgitation into the sophagus*

DISEASES OF THE INTESTINES

REGIONAL ILEITIS (code No 654 952)

An acute or chronic inflammation of the di tal portion of th

small intestine characterized by ulceration and scarring and often as ociated with int rnal and external fi tulae The condition must be diff r ntiated from other specific causes of enterocolitis (e g tube culosis chronic bacillary and am bic dys nteri s) The his tory often of long duration, is one of mild intermittent diarrhea and abdominal cramps relieved by bow l movement The acute form may simulate appendicitis

Physical finding may in lude tender masse in right or left low r quadrants fistulous tracts and perirectal abs esses Occult blood is often p e ent in th watery stools Gastrointestinal x r y series (small bow l study) reveals a loss of the mucosal pattern with narrowing and irregularity of the t rminal ileum (" string ign ")

T eatment.

A. Corrective. Radical p imary re ection of the involved por tion of the bowel is the procedur of hoi e after a reasonable period of conservative medical therapy has b en tried D pit ext nsive surgi al treatment the disease will r cur fairly oft n

B Palliati e.

1 Di t Bland, high calo i high vitamin adequat in pro teins
2 Symptomatic treatm nt of anemia, diarrh a, avitaminosis as indi ated
3 S lfonamides and antibiotics Although of doubtful value those sulfonamides whi h are poo ly ab orbed from the gas t ointestinal t act might be given a tri l (ee p ge 499) Th effectivene s of streptomycin and Aureomycin® have not been completely evaluated
4 C rticotropin (ACTH) and cortisone may p oduce beneficial r sults in ertain pati nts with r gional ent ritis but res lts have been quite variable and gene ally not too encour ging Experien e would indicate that long term u e of th se ag nts may not be without ha ard and m y res lt in increased de struction of intestinal tis ues
5 Palliative surgery Sh rt i cuiting operations may be necessary when involveme t is ext ive and compli ated

DIVERTICULOSIS (code No 660-642)
DIVERTICULITIS (code No 660-642 0)

Multiple acquired or congenital evaginations (pou h lik p o- j ction) may occur at any place along the cours of th bow l, espe ially the c lon. In diverti ulosis the lesions are a ymptomatic and are di covered a cidentally on x y examination. Inflammation of diverticula (diverti uliti) with symptoms of intra abdominal in flammat on ref rable to the involved it occurs mainly in indi viduals above 40 year of ge Variabl lower gastrointestinal symptom occur depending on loc tion of diverticula Abdominal pain and t nderne f ve and bowel di turbances requi diff r ntiation f om acute appendicitis Laboratory evidence of inflam mation may ist and x ray demonst tion of div rticula helps to confirm the diagnosis

except in those circumstances where there is a deficiency of these vitamins (due to inadequate food intake) It is felt that if vitamin B complex administration is indicated it is provided by the following
(1) Dried brewer s yeast powder 15 30 Gm (1/2 1 oz) daily or 20 30 0 6 Gm tablets daily
(2) Vitamin B complex high potency preparations
(3) Crude liver extract 1 2 cc I M 1 2 times weekly
(4) Choline and methionine as specific dietary supplements are of questionable value

d Amino acid supplements (protein hydrolysates) may be in corporated in oral tube or parenteral feedings as indicated
(1) Oral 2 15 Tbsp t i d (to supply 50 400 Gm daily)
(2) Tube 2 15 Tbsp t i d *Rule out varices first*
(3) I V 5% solution with 5% dextrose 1 3 liters daily

e Skimmed milk may be used for oral or tube feedings

f Salt poor albumin 50 100 Gm daily may be employed *in severe cases (very expensive)*

g Ascitic fluid Readministration of ascitic fluid by sterile technic (if protein in ascitic fluid is greater than 1%)

h Transfusions of whole blood if se ere anemia and hypoproteinemia coexist

3 Ascites and edema may be treated by

a Low sodium diet Reduce sodium intake to less than 2 Gm NaCl daily (see page 53) and even less if necessary eve though diets severely restricted in sodium are apt to be nutritionally inadequate and unpalatable The danger of inducing the so called low salt syndrome with renal failure coma and death must be considered and watched for

b Attempt to restore plasma proteins to normal levels (as above) *This is very difficult to achieve*

c Cation exchange resins have a limited use when used, however the potassium resins should be employed since large doses of the ammonium resins may result in acidosis and ev n death Large doses of resins a e necessary to achi ve any significant sodium reduction

d Mercurial diuretics 1 2 cc I V or I M once or twice a week (see page 204)

e Abdominal paracentesis for pain discomfort or inability to eat if necessary

f Surgical procedures to relieve portal hypertension may be considered in selected good risk patients In younger patients in otherwise reasonably good physical condition in whom hepatocellular dysfunction is relatively slight the portacaval anastomosis may be employed with benefit

4 Anemia

a Hypochromic anemia Ferrous sulfate 0 2 0 3 Gm (3 4 1/2 gr) enteric coated tablets t i d p c

b Hyperchromic m crocytic anemia Crude liver extract 1 2 cc I M once or twice a week

5 Hemorrhagic tendency due to hypoprothrombinemia may b treated with vitamin K preparations although this treatment is ineffecti when intrahepatic damage is severe Blood

transf sions may be nece s ry to control th bleeding t d ency Some caution sho ld be ob v d in using larg doses of sali ylat s in th se patie ts be au e of the nhanced hypoprothrombin effe t

a Oral Menadione U S P Menaphthone B P 1 3 t bl t of 1 0 mg (1/60 gr) each t i d p c If ob truc tive jaundice is present give upplementary bil salts (s p ge 286)

b I V I M Menadion Sodium Bisulfite U S P 2 mg (1/30 gr) every other d y

6 Hemorrhag f om oph g al varices Se ere ble ding can at tim s be ontroll d by th us of the triple lumen tube Surgi al measures are usually ha ardou and uns ti f ctory

7 Mi cellaneous probl ms

a Pru it s (e p ge 67), nausea and vomiting (see p ge 251) and constipation (see page 254)

b Corticotropin (ACTH) and o tiso Th se ag nts should be used with f l n id ti of hazards of h mor rhagic te d y portal thrombosi and sodium t tion Th y are best not us d in advanc d cirrhosis

ACUTE CHOLECYSTITIS (code No 687 100)

Acute inflamm tion f th gallbladd r m y consist of any one of a wid riety of p th logi le ions of the g llbladd r which ar dif ficult t diff tiat linically Th condition m y d lop a a res lt of obstru tion of the biliary p ssag s with o without tone o as a result of inf ction Clinical findings m y vary on ide ably in indi idual cas s b t f purposes of man g m t th y may be conveni tly di id d int 3 g oup acco ding to ity mild, interm di te and s

Di gnosis

A Sympt m

1 Hist y of chronic dyspep ia or proved biliary alculi may o m y ot b elicit d

2 Atta k f ight uppe qu drant coli f equ ntly nocturnal with residu l gallbladder t d rne oc u

3 N us and omiting a usually present d ring acute pi od s

B Physi al E amin tion

1 J und m y oc d ring or following atta ks

2 Loc li ed right uppe quad ant tenderne i common

3 Fever may be pres t o ab t

C Labor t ry Findings

1 Leukocytos is in onst t

2 Ict rus inde i e vated in common du t obstruction

3 X ray findings ar va iabl and at times difficult t int r pret A gallb dder whi h fills poorly w th the dye o mpti s lowly ma be normal Demonst ation of stone in the hol cystogram is the most important finding

Tr t m t

A M d Type (M ld or ind finite symptoms Doubtful di gnosis)

of acute colic
2 Abdominal distention
3 Nausea and vomiting
4 Intolerance of fatty and gas forming foods

B Laboratory Examination
1 Gallbladder dye demonstration of poorly functioning gall bladder (poor filling and emptying on repeated examination) and/or biliary calculi
2 Duodenal drainage may demonstrate excessive quantities of exfoliated epithelium mucus bacteria and pus in dark fraction of bile

Treatment

A Medical Management
1 Ind cations
a Patients without clinical or x ray evidence of stones who respond to careful medical treatment
b Questionable diagnosis or low grade symptoms Differentiate from functional dyspepsia (a difficult problem)
c Pati nts who refuse surgical treatment
d Poor operative risk patients
e Patients with a short life expectancy from other cause
2 Treatment
a Diet In general 2 differe t types of diet
(1) Low fat diet (classical type) This diet excludes both cooked and uncooked fats from all sources (see page 52)
(2) No-grease diet (modern concept) This diet excludes only the cooked fats (greases) which are non emulsified at body temperature but includes the un cooked fats such as are emulsified at body temperature The first phase of this di t is similar to the Sippy I diet with frequent feedings of milk and cream as improve ment occurs the diet incorporates eggs butter cooked vegetables and fruit and cereals as tolerated
b Antispasmodi medication Very useful
(1) Tinct re of belladonna 10 drops t i d a c
(2) Belladonna extract 15 mg (1/4 gr) t i d a c
(3) Phenobarbital antispasmodic mi tures (see pag 266)
(4) Atropine sulf te 0 4 0 6 mg (1/150 1/100 gr) orally sublingually or subcutaneously
c Bile acid preparations Not to be used in patients with biliary stasis due to complete mechanical obstruction A cholagogue stimulates evacu tion of the gallbladder a choleretic alters secretion of the bile constituents a hydrocholeretic alters volume of bile
(1) D hydrocholic acid N F (Decholin®) 0 25 Gm (3 3/4 gr) t i d p c choleretic (?) hydrocholeretic
(2) Ox Bile Extract U S P capsules 0 3 Gm (5 gr), or tablets 0 2 Gm (3 gr) t i d p c cholagogue choleretic and hydrocholeretic
d Sedation Phenobarbital antispasmodic mixtures (see page 266) and barbiturates (ee page 35)
e Antacids These drugs freque tly provide empiric reli f of many of the annoying symptoms of gallbladder dysp psi Their mode of action is not clear but they a e felt to

relie e a social d hyp racidity and to have a soothing ff ct on th duoden m and phinct r (ee page 264)

f La tive drugs (th rti s)

(1) Sodi m ph phate (disodium phosphat) 4 8 Gm (1 2 dr o 1 2 tsp) dissolved in warm w te befo e b eakfast

(2) M gn sium s lf te (Ep m alts) Dist teful 4 8 Gm (1 2 d or 1 2 t p) dissolved in warm w t be fore b kfast This may be u ed initially but its prol ged s is inadvi able

g Local heat t abdome Hot w t r bottl o el ct ic p d p r n fo mild d omf rt

B S gic l Man g me t

1 Ind at on (p viding th pati nt is good surgical risk)

a P tie ts without linical r sy vid ce of ston s who fail to re pond to intensive medic l t eatment Surgical ults howeve are l qu stionable

b P ti t with b liary stones with or without jaundice who b recur t att ks of right uppe abdominal quadrant pain A ympt m ti chol lithiasis in p ti nt l s than 45 yea s of age is onsid ed by ome to be an indication for gery

c Patient with suspicion of gallbladd r m lignan y

2 Ch ic of ope ation is controver ial In ge eral h lecys t ctomy is p ef ed to the p lliative p ocedures pt when the surgic l risk i poo the pati t is s riously ill, r ther e te hnical contraindi ation

DISEASES OF THE PANCREAS

ACUTE PANCREATITIS (code No 690 930)

A t pan titis i h act ri d by a s dd n ons t of s vere agonizing, onstant o emitte t pain often ext nding to the mid ba k houlders or flanks Symptom of va omotor collapse (shock) may be pre t Par lytic ileu or obstipation and vomiting oft n oc u A pa t hist ry of dyspepsia, ulcer r g llbladd r dis ase may be licit d Physic l e mination re als epiga tric tender ness and rigidity Th r is usually abdominal distention. Ther is an le tion of s rum amyl and lipase l vels (may be t ansitory) Leukocytosis is common and glycosuria may occur

Treatment.

A Em gency M ure for Impendi g Sho k (V somotor Col lap page 31)

1 Bed rest in shock position (ee page 3).

2 Morphine sulf t 15 20 mg (1/4 1/3 gr) subcut or if neces ry I V may be employed for the relief of pain P rhaps Demerol® 100-150 mg might be of va ue as sub stitut for morphine sulfat because of it alleged antispas modi action

3 At opine su f t 0 4 0 6 mg (1/150 1/100 gr) subcut should be given as an antispasmod

4. Glyceryl Trinitrate U S P (nitroglycerine) 0 3 0 6 mg (1/200 1/100 gr) sublingually may be employed for relief of severe pain
5. Parenteral fluids
   a. Plasma Give 250 500 cc of plasma I V immediately and follow with subsequent infusions of plasma such as are necessary to correct dist rbed fluid balance
   b. Crystalloids 5% glucose and/or normal saline may be used initially in lieu of plasma (when the latter is not avail able) or to correct altered fluid and mineral imbalance
6. Withhold food and fluids by mouth
7. Employ continuous gastric suction
8. Careful observation The patient should be constantly at tended and vital signs should be checked at 15 30 minute intervals as indicated during the acute period Blood count hematocrit serum amylase and lipase should be checked

B. Follow up After the patient has reco ered from shock or if pati nt has not developed shock 2 alternatives should be con sidered with regard to further immediate management
1. Conservative or expectant medical management This is to be preferred whenever possible The patient should be ob served closely for evidence of continued inflammation of the pancreas and/or related structures The opinion of a surgi cal consultant should be obtained in every case of suspected acute pancreatitis
2. Immediate surgical intervention When the diagnosis is in doubt and there is a possibility of a serious and surgically correctible lesion (e g perforated peptic ulcer) an explor atory operation may be indicated
3. Observation The course of the inflammatory process should be observed by frequent repeated physical examinations and blood counts and by blood sugar levels and serum and urine enzyme determinations as indicated
4. Supportive therapy
   a. No fluid or foods should be given by mouth for at least 48 hours and continuous gastric suction should be main tained for that period
   b. After 48 72 hours small quantities of bland low fat liquid foods may be introduced gradually by mouth as toler ated Gastric suction may be temporarily discontinued several times during th day for small oral feedings and then gradually discontinued depending upon clinical prog ress
   c. Fluid and electrolyte balance is maintained by appropriate *parenteral fluids* *(see page 10)*
   d. Atropine sulfate 0 4 0 6 mg (1/150 1/100 gr) subcut may be administered t i d in an attempt to suppress pancreatic secretion

C. Conval s ent Care When clinical evidence of pancreatic in fl mmation has cleared
1. Bland low fat diet should be giv n
2. Drugs
   a. Belladonna extract 15 mg (1/4 gr) t i d r atropin sulfate 0 4 0 6 mg (1/150 1/100 gr) t i d
   b. Antacids may be of value (see page 264)

3 Ev luation of pati nt f surge y Consid th p ti nt re fully for l ctive rgical t tment of biliary tra t disease t h lp prevent r curren of att ks

P ophylaxi

A All as ociated eti logical fa tors should be corr t d e g bilia y tr ct di e duode l lce et

B Di t P ti ts who ha had p ious mild attacks of a ut pan reatitis hould be pla d on a low f t di ta y gimen and permitt d no al ohol this m y r duce th p ssibility f sub s que t att cks

CHRONIC PANCREATITIS (code No 690 956)

Chronic inflamm t y diseas of the panc s is ssociat d with fibrosis of th gland In the int rlobular type the xt rnal se cretions are ofte d ficie t and digestive disturbanc s ar f qu nt In th int acinar type th islet ti ue is i volved and diabete de velops A te pancre titis malignant dis ase pan reatic calculi pe trating peptic ul h p tobilia y di se and ge e alized arte ioscle osis r the m e common causative f to s Th e m y b a hist ry of current epi od s of pigastric pain and te der ss fl tul nce and bowel irregul iti s The physi l e ami nation r ve ls only an i regular r intermitt t i t rus

Laboratory findings may includ b lky foul f tty stools con t ining undig sted food glycosuria d creas of pan atic e ym s and duod nal drain ge Panc e tic cal ific tion m y be s on x ray

Tr tm t

A Spe fi M None

B Ge l M

1 Rem ggr ting f ctors wh n pos ibl

a Corre t h p tobiliary dise se

b Tre t gastroduodenal di eas (e g pen tr ting pepti ul)

c Fo bid the use of alcohol

2 N trition

a Di t High CHO low fat, low prot in, high calcium diet When pancreatic achylia i the con pi ou f ture of the ilin s protein hyd olys tes m y be mployed to uppl m t natural protein If diabete is p e t di tary modification may be n ces ry (pag 53)

b Vit mins M ltivitamin tabl t and B compl x it mins hould be given.

c Cal ium salts Cal ium gluconate 1 Gm (15 gr) tabl ts 2 3 tablets t i.d m y be give to h lp pl e c lcium lost in stool

d Repla ment of defici t pancr ati nzym s Pancr atin U S P B P (vailable in f ll y pot t form, 0 32 Gm (5 gr) nt ic oat d tabl ts 1 3 tab ts t i d p c Dete gent age ts such a sorbitan monooleat may be used to correct the impaired f t and calcium absorption

RELATIVE VALUE OF VARIOUS LIVER FUNCTION TESTS IN JAUNDICE AND LIVER DISEASE

Physi logi B is for T st	TEST		ACUTE HEPATIC DISEASE: P icteric Ph se	I t i Ph: Ob t ti e	I t i Ph: I t h p tic	I t i Ph: H m lytic	Con l ect Ph e	Lat t or S bcli ical H p ti Dise e	Chronic Hep ti Dise e	N rmal Range of Values
Bil P gm t Metab lism	Urine Bilir bin	P	A (in)	B	B		B (d)			
		Ab				A				on
	U ine U obilinog n	In	A (in)		A	A	B (d)	B	B	1 4 mg 24 H
		Ab e		B						
	F Urobilinogen	I				A	B (I)			50 250 mg /24 H
		Ab nc		A			B (f)			
	S um Bilirubin (I t rus Ind)		A (incr)				A (de r)	B	B	0 05 0 50 mg %
E ym A ti ity	S um Alk lin Pho phatas			A ( )						3 11 U it 2 4 5 U t (Bod h)
Ch l t l M t b li m	Plasm Ch l t r l	E t ifi d			B (d)					60 75% of Tot l
		T tal		B (in)						100 250 mg %
P ot Synth is	Plasm Prothrombin	B f Vit K								80 100%
		Aft Vit K		A(p n)	A ( )				B ( )	15% (48 H
	S um P otein	Albumin						B	B	3 4 6 5 Gm %
		Glob lin						B	B	2 0 3 5 Gm %
		T t l							B	5.7 8 2 Gm %
	S um Thym l T bidity						B	B	A	0 4 U
	C ph l Floc l tion		B					B	A	0 1
Dy E tion	B m ll l in (5 mg /Kg)				B		B	A	A	5% (30 minut) 0% (45 mi t)
Gly in Synth	Hipp i A id I V						B	A	A	> 0 70 Gm H
Gly g Synthesis	G l ctos T l anc I V			A (high les an e)	A (l w l an)				B	0 (75 mi l)##P

Lette indi at l ti e di gnosti l e of th ious t ts i ch of the clinical pha m tioned in th tabl
A E ll nt B Good ( ) Limit d o l

V l e wid ly with ariou lab S ri l d t mi tion imp rt t (No pon e)
With j di l > 20 ignifi ant
Without j di l e > 10 ignifi ant

3 Drug
   a Ox Bil Ext ct U S P (bil s lts) 0 5 Gm (7½ gr) t i d p c may be of val
   b Hyd ochl ic Acid Diluted, U S P B P 1 0 4 0 c (16 64 min) t i d with m als
      F r ous s lfate 0 2 0 3 Gm (3 4½ gr) t i d p c for anemia
   d In lin for di b t s wh p sent (p g 395)

PANCREATIC CARCINOMA (code No 690 8)

C rcinoma of th pancreas oc urs mo t commo ly in m l s ove 50 y rs of age It is characte iz d by epiga t i pain ext d ing to the ba k r pid and marked weight loss and m ltipl gastro int stinal complaints Physi l mination m y r veal an pig s t ic mass ict us and hep tic nl rgement Laborat ry findings in l d vide ce of di tu bances of ca bohydrate m tabolism ele tion f s rum lipase and myl s and wid ning of duod nal loop o rse S configur tion of duode um o ay

T tm t
   A Non ope tive M asur Symptom tic and palli tiv
   B S g al M ur
      1 R d l s g l xcision in sel ct d c s s
      2 Palliative surgi al ope tions Bili y t a t shunting p o- dur s in indicated as sociated with j undi

Chapter 11

DISEASES OF THE URINARY SYSTEM

NONSPECIFIC URINARY SYMPTOMS

Urinary symptoms should never be ignored Symptomatic treat ment must never be substituted for a thorough investigation of the underlying organic or functional abnormality

FREQUENCY OF URINATION
(code No 706) (Nocturnal code No 707)

Frequency is one of the most common of the urinary symptoms *and may occur either during the day or night It may be caused by* any of a variety of organic or functional disorders and is often of psychogenic origin

If the symptom is disturbing to the patient treatment can be instituted while diagnostic procedures are being completed Use antispasmodic sedative drugs as for dysuria (see below) Fluid restriction may be employed particularly at night if there are no contraindications

DYSURIA (code No 704)

Dysuria may be caused by infection of the genitourinary system or by lesions of the lower urinary tract It is usually associated with urgency and frequency Mild discomfort may also be produc d by a highly concentrated acid urine

Tr atment

A Specific Measures Treat the underlying disease

B Symptomatic M su s Antispasmodic and sedative dr gs

1 Atropine S lfate U S P B P 0 4 0 6 mg (1/150 1/100 gr) every 3 4 hours or other parasympatholytic drugs (see page 39)

2 Phenobarbital U S P Phenobarbitone B P *15 30 mg* (1/4 1/2 gr) t i d q i d or more as n eded

3 Bladder sedative mixture

℞ Potassium citrate	30 0	℥i
Hyoscyamus tincture	30 0	℥i
Elixir of phenobarbital q s ad	120 0	℥iv

Sig 4 cc (1 dr) t i d a c and h s or q 4 H

OLIGURIA (code No 702) and ANURIA (code No 703)

(also see Lower Nephron Nephrosis page 303)

Oligu ia d an ria are u lly s iou symptom and m y be d to many c uses hock cong ti fail e d hydration nal failu e o th l ss common disorde It is imp rtant to diffe tiate these sympt m f m urin ry tenti

Tre tm t

A Sp if Me a Tre t underlying d sease

B Fl d *Do not give excess fluids to patien s with oliguria or anuria due to renal f ilure death will result from overhydratio* Simple d hyd ation d t in d q t fl id int k or in a d loss (u d by e sive pe spir tion d h a) is e lly cted by or l or p r t al fluids R pl any elect olyt loss (s e p g 21)

RETENTION OF URINE (code No 705)

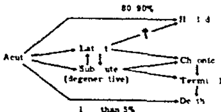
U i ary t ntion du t ob tru tion may be e th t or h onic and is most omm ly due to l g m t f th p o tate Th bl dde may b p cussed d p lp t d b e the symphy i Pl p ti nt i wa m tub of w ter unl thi procedu e is ontr i di t d by oth i tt g dis ase If thi i un u e sf l or c nnot be employed th pati t should be th t d Correc tion of underlying bnorm lity i y t p eve t u c

SPECIFIC DISEASES OF THE KIDNEY

GLOMERULONEPHRITIS

Gl m rulon ph iti i pp tly a diff as l dis s p m ily involvi g both kidn y Th di i beli ved by s m t be d l y d all gi r pon e t bact l l inf ction (u lly beta hem lyti at ptococ l inf tion) Th ub ut nd hron f rm of the di as ep t a pr g ion of th urheal d acut l l sion

The our of the dis as an best be outli ed by th f llowi g h t



It is difficult in the initial attack to predict the course of the disease However about 80% of the patients have mild damage which allows for healing Most of the other 20% enter the so called latent phase and the nature of the progression of the disease seems to depend primarily upon the extent of the renal lesion The greater the amount of initial damage the more rapid the progression to subacute terminal stages and death By proper treatment it may be possible to retard this process

Diagnosis

Diagnosis of glomerulonephritis rests primarily upon the urinary findings of red blood cells and/or red blood cell casts therefore a careful examination of a freshly voided urine specimen is the b st single examination in making the diagnosis

General Principles of Tr atment

The problems of therapy in renal disease are threefold Treatment of each aspect of the disease will be discussed in terms of these principles

A Addis s Principle of R st . The cause of the progression of the renal lesion in glomerulonephritis is unknown Dr T Addis suggested that progression is due to too great a work load for the amount of functioning renal tissue remaining Most of the work of the kidney was assumed to be in olved in the concentration of solutes (i e the reabsorption of wat r against osmotic pressure) Urea is the most important solute Hence it was suggested that the less urea (from protein catabolism) and more water the less work

However it has recently been shown that the percentage of energy utilized by the kidney (O_2 consumed) in the concentration of solutes is such a small fraction of the total as to make this thesis untenable

On the other hand the empirical evidence of Dr Addis s principles have not yet been r fut d Therefore an adequate but minimal protein intake remains important in influencing the course of the disease

B Correction of Physiological Alt rations Since many of the manif stations of renal dis as cause or are associated with marked physiological alterations (e g hypo lbuminemia in the nephrotic syndrome) therapy is aimed at correcting th s physiological disturbances as they occur However many of the defects appar ntly corrected quickly revert to the disease state as soon as therapy is stopped (e g return of hypoalbuminemia after I V albumin is stopped) This may make continued intensive therapy imperative if one wishes to prolong life especially in terminal cases However do not use ther peutic means which appear to correct the physiological defect but which are in themselves unphysiological or tend to defeat Principle A above (e g high protein diet to correct hypoproteinemia)

C Complications Complications are treated as they arise and are discus ed in the appropriate sections

ACUTE GLOMERULONEPHRITIS (code No 712 100)

Di gnosis

The history usually reveals an ons t of hem turia puffines about th ey h ad he and oc a ionally malai e and f ver occur ing 7 10 d ys aft an inf ction (usually sore throat) Th urine usually h s a low specifi gr vity except when oliguria is p s t in whi h ase it may be elevat d. The urine sedim t is load d with r d ells and white c lls (tubul c lls) but has only few ts Red c ll cast pathognomonic Mild to mod r te prot inuria is pr nt There m y be inc as d blood volum and app t or e l an mia Th serum blood ure nitrog n and creatinin m y be ele t d Hyp rtension is usually p t

T tm t

A Sp ific M a There is n specifi t tm t Tre tme t f cut n ph tis with orticotropin (ACTH) or ortisone has been g nerally quite uns tisf ct ry A f w e pond w ll, but these a exception Gre t care must be e cised in the se of corticotropin (ACTH) or cortison in this disease f overdosag can l d to increased ed ma and precipitate acute cardiac fail e Sodium striction should b rigidly observed (s e pag 53)

B Ge al M s s Th is little that can be don to alt r th abn mal phy iol gy i inc eas d blood lum elevated N P N tc Th t nd to dis ppe spontan ou ly a the ondition imp oves

1 H me ca or hospit li tion The ave ge c e of cut n phritis c n be ared for in the home although hospitaliz tion be ome n s ry if complic tion de lop

2 Bed r t The p ti t should m in in bed but may have b throom pri il g s Th d ation of the pe iod of b d r t is difficult to anticip te but it appe rs th t ly activity l da t a m e b tion of the renal l sion A good g ne al ru is t ke p the p ti nt in b d until the edim ta tion r t i no m l, until the blood pres ure and blood N P N h ve been normal for bout 2 w ks or until the u inary find ing show ot more than 0 2 Gm protei /24 hou Do not w it for r d cells to di ppe r f om urin if patient is e t ing th l tent t g they m y remain for lif R turn to activity should be gr d l

3 Di t

   Initi lly light diet with p ot in triction l indic ted Gi 0 2 0 3 Gm prot in/Kg (0 1 0 15 Gm /lb) body w ight for fir t 7 10 d ys Then in r ase to 0 5 Gm /Kg (0 23 Gm /lb) body w ight pl s the amount of prot in lost in ri

   b Fluid and parenter l f edings (Se p g 10 29 for complet discus ion)

   (1) Do not forc fl ids but ow fluids ad lib Adj st fluid intak to changing physi logi l stat (e g if oliguria d velops fluid r t i tion m y be ne ss ry to void drown ng the patient) In the acut phas d resis cannot lw ys be induced by forcing fluid

   (2) I V Fluids a rar ly indi a d x pt in case

associated with dehydration or abnormal fluid losses In these cases it is important to give parenteral serum albumin 0 2 Gm /Kg (0 1 Gm /lb) of body weight and sufficient glucose to maintain as close to an iso caloric intake as possible Give I V fluids slowly

4 Blood If anemia is marked a carefully cross matched blood transfusion may be administered slowly

C Treatment of Complications

1 C rebral edema with resultant headaches and convulsions
   a If headaches are not severe and convulsions are not pres ent give sedation with pentobarbital 15 60 mg (¼ 1 gr) or paraldehyde 4 8 cc (1 2 dr) b i d to q i d as necessary
   b If headaches are severe and convulsions are present give magnesium sulfate 1 0 Gm (15 gr) (10 cc of 10% solu tion) I V slowly *CAUTION whenever administering magnesium sulfate I V always have syringe filled with 10 cc of 10% solution of calcium gluconate or other calcium salt ready to admin ister I V if narcosis develops or respiration ceases*

2 Cardiac failure One of the most common causes of death in acute nephritis is acute cardiac failure At the first sign of failure digitalization should be instituted by one of the rapid methods (see page 197) Sodium restriction should also be instituted immediately

3 Focal infections Any focal infection especially of an acut nature should be treated promptly Chemotherapeutic agents and antibiotics may be used as necessary for this purpose but they are of no value in the therapy of the nephritis itself Effective blood levels of sulfonamides and penicillin may be maintained with smaller dosages than under ordinary clinical circumstances this is due to the decreased tubular excretion *(especially of penicillin) or the decreased glomerular filtra* tion (as with sulfonamides)

SUBACUTE GLOMERULONEPHRITIS (code No 712 100 0) (Nephrotic Syndrome code No 713 x40 or Degenerative Nephritis)

Diagnosis

A history of previous acute nephritis may not be elicited The question of whether all cases of the nephrotic syndrome are pre ceded by acute nephritis has not been settled but it appears that they are not The mo t comm n phy ical finding is marked pitting ed ma Prot inuria is marked the urin ry sediment contains many casts (especially fatty casts) and many epithelial cells but few red cells The blood N P N and creatinine are normal but the serum albumin is low and there is a marked lipemia An anemia may also be found Azotemia is also present in some cases

Treatment

A Specific Measur s Corticotropin (ACTH) and cortisone h v be n employed n the tre tment of subacute nephritis with

ll t results Th u e of these hormon s r lts in a marked decrea e or enti disappea ance of the albuminu is with a s b qu nt or con mitant diur is and a g d al ret rn of s rum albumin t o mal level The dos ge and duration of dminl t tion a qu te variable The ar two m in points of view

1 Int rmitt t th rapy Th drugs a e g ven i short ourses of 7 14 d y and p ated s n sary Ov 50% of p ti t so treated ha rel p d promptly (see page 423 f dos ge)
2 Continuous th apy The ad oc t s of ACTH and co tisone th py p int out that this is a ch onl dis ase and that th re is no evidence that the e dr g in any w y infl ence its ulti m t course Th drugs re giv n ontinuou ly in the low e t dos g pos ible to k ep the disea e und ontrol (e g urine free of p otein)

All precautions for corticotropin (ACTH) and corti one d ministration should be obs rved

B Ge rel M e

1 R t The prin iple of r t for th kidneys is ontinu d in thi t g (e p ge 294) Thi st g m y rep e t a p o gr ssion of the ren l lesion and l d into the te minal st ge The transition may be rapid or there may be ec r en s f dem o er a period of many years
2 Diet Be us of th ma ive lbuminuria an attempt is m de to keep th body in nit og n b l n but at the s me time not to overl d the kid y *There is no evidence that the hypoproteinemia can be corrected by a hi h-protein diet per se During lo g term cortico-tropin (ACTH) or cortisone ad inistration great care should be taken that the protein intake is ade uate at least 1 Gm /Kg (0 5 Gm /lb)/day*
   - Adult 0 5 Gm protein/Kg (0 23 Gm /lb) body w ight pe 24 hou plu an amount of prot in per 24 hour th t i qual to that lost in the ri (E ampl 70 Kg man with p oteinu i of 10 Gm /d y 0 5 Gm /Kg body w ight 35 Gm p ot in 10 Gm lost in u in 10 Gm protein Total 45 Gm of prot in pe d y as th app oximate in take)
   - b Ado s t 0 75 Gm prot in/Kg (0 35 Gm /lb) body weight pe 24 hou s pl urine loss
3 Tre tment of d ma Th prime aim of the py f om a phy iologi l point of vi w is the tt mpted remo al of d m Fo thi the e ar a veral aid vailabl
   - a Sodium t iction This i p ob bly the m thod of hol although not alw ys f tive when used alone The sodium i re trict d to below 1 0 Gm (15 g) pe d y t times r t i tion to 0 5 Gm (7½ gr) pe d y m y be n ce ary This r t i tion should not be rei d out longe than is clinically ne s ry and wh n the re tr tion i m ked the pati t hould be w t hed for ymp tom of od um d ficien y ... f s hould not be em loyed ... te patie t to ll w n ... salt int k Lo term use c exchange re ... has pre ed u satis actory ... ore ... palata le and t ... ts produce ... is

b *Mechanical removal* Whenever the fluid accumulation becomes very marked mechanical removal is one of the most beneficial methods This includes removal from pleural and peritoneal cavity and especially the use of Southey's tubes to remove massive edema from the legs Any infection resulting from use of Southey s tubes shoul be controlled with antibiotic agents

c Agents to increase osmotic *pressure of blood*

(1) Salt poor human albumin Of all the measures that *have been employed to increase osmotic pressure thi* agent has the soundest physiological justification. *50 Gm (1 2/3 oz) per day I V* may induce a rapid diuresis However the effect is transient most of the albumin is lost in the urine and much of the re*mainder is rapidly catabolized After cessation of the* therapy (may be continued for from several days or weeks) there is little evid nce that the course of the disease has been modified and in most cases the serum albumin concentration will return to its former low level

(2) Blood plasma Plasma has little value primarily be cause of its high salt content It may also carry the vi*rus of infectious hepatitis*

(3) Some of the newer plasma expanders (Dextran® Gelatin *Plasmoid® etc) have been employed Although they* may induce a temporary diuresis their routine use is not yet indicated

(4) Other preparations such as acacia and isinglass are mentioned merely to be condemned Their use is entirely unphysiological

4 Acid salts (i e ammonium chloride) The e drugs may be used but their effect is often not noted until mild acidosis develops Since these patients may readily develop acidosis caution should be exercised in use of these drugs

5 Urea Although urea is a diuretic it should not be us d for it is the very agent that is being excluded when a restricted protein diet is given

6 *Mercurial diuretics are not advised* They m y cause at least temporary r nal damage and generally are not bene*ficial*

7 Water Patients should be encouraged to drink adequate *fluids As long as there is sodium restriction* wat r will not accumulate in the tissues Forcing fluids however is of little value in inducing a greater *diuresis if fluid intake* and urinary output are adequate

8 Induction of infection It has long been known that *patients* with the nephrotic syndrome develop remissions following some virus infections especially m asles *In susceptible* children with subacute nephritis exposure to one of the mild exanthematous diseases may be indic ted

C Tr atment of Complic tions The principal omplications are infections commonly pn umonia and pn umococcal *peritonitis* These should be treated with the app opriate chemotherapeutic and antibiotic drugs

LATENT GLOMERULONEPHRITIS (code No 712 190)

Th pati t with l tent nephritis may or may not gi e hi t ry of an tta k of cute gl m rulon phritis In th lat nt phase al though there ar no complaints o physical findings the le ion either ha ot h led t ll or there is in uffi i t h aled tiss e t ca y the e tire load of wo k *The latent phase may last for as long as 20 to 30 years* and the p ti nt m y die of other intercur t di ase b t his r nal function f il

Diagnosis

The only positive findings a e occasio al red blood c lls d c ll casts and t ansi nt to pe si tent albumin ia The physi l examination and all blood findings (hematologi al and h mical) r normal

Tr atm t

A Ge l M re

1. Di t The p tient should b on a minimal but ad quate di t ontaining 0 5 0 75 Gm p ot in/Kg (0 23 0 35 Gm /lb) body weight At l t 50% of th p otein should consist f d iry products vegetabl s and e als
2. Fluid The p tient should be t ght t f c fl ids 3 000 4 000 cc (3 4 qt) pe d y
3. Activity Th patient hould be cautioned ag inst strenuous x rcis but should be e our g d to li as mal a lif s pos ible
4. Phy l l gi al consid tion Sinc th i no pp t physi l gi l abno m lity no sp cifi tr tm t i indi ted

B C mpli tion Pseudo- b tion of ymptom P tients with l t t phritis have a cha teristi on pe ifi e pon to any f b il ilIne s this is particularly ma ked in th e of foreign protein rea tions (g vaccin tion inoculation, o inf ctions) This r action i char cterized by hem turi (often gross) and a mild incr e in p ot inuria and white blood cells coming on imm di t ly with th f ve and ub iding with the feve *This is not another attack of acute nephritis* Ther is no delay betw n inf ction and ren l tion no hyperten ion no dem d no an mia

It i dingly r re t have a ond att ck of true a ut glom rulonephriti Most ases of o- alled s ond a tack ar really c bations of late t n ph itis Th e ac rba tions never dam ge the kidney eve ly a the initi l tt ck and on can ra ely detect any hange in renal t i aft r th attack is over

1. Prophyla is Bec of the as ociation of xa b tion with f ver inf ction and cination, on should avoid the insults whenever pos (b) Pat t with l ent ne phritis shou.d not und rgo va ination rout nely
2. T e tment The is no tr tm nt of the re l i e on other than continued treatm t o the l t nephriti Tre ment i aimed enti ly at the p ip ting ue The patient should be kept in bed for about l we k aft r f ver has d p- peared and should be a owed up slowly ove t e next week

CHRONIC OR TERMINAL GLOMERULONEPHRITIS
(code No 712 100 0)

It is difficult to say when the terminal or chronic stage begins It is the time at which signs and symptoms of renal insufficiency develop It may be very difficult to detect early but as it de elops certain findings appear Most characteristic are the (1) elevation of blood N P N (2) de elopment of anemia (3) gradual elevation of blood pressure and (4) presence of a few casts and red blood cells in the urine However the blood protein is normal edema is ab sent early and there is slight proteinuria This stage may last from several months to a few years

Diagnosis

A history of acute or subacute nephritis may be elicited The physical findings vary with the severity of the disease but hyper tension with its associated vascular changes is the most common finding Edema usually appears and may be due to cardiac or re al failure The urine has a low or fixed specific gravity There is a mild to moderate proteinuria The sediment contains a few red cells and broad casts (renal failure casts) and a few epithelial cells As anemia develops increased blood urea nitrogen altera tions in lectrolyte balance and a decrease in serum proteins occur

General Treatm nt,

A Di t As the blood N P N and creatinine begin to rise any in crease in protein intake is followed by a marked rise in N P N The patient s protein intake must be restricted to 0 5 Gm /Kg (0 23 Gm /lb) body weight plus the urinary losses

B Fluids are forced to 3 000 4 000 cc (3 4 qt) per d y

C Treatment of Physiological Abnormalities As the N P N con tin es to rise and renal failur become more severe there is a progressive tendency to acidosis and altered electrolyte bal ance The kidneys become unable to form ammonia or con serve fixed base and fixed base elements consequently begin to decrease in the blood

1. Early in the terminal phase these are replaced by oral use of salts Either of the following may be used
   a Calcium lactate 3 5 Gm (45 75 gr) daily
   b A mixture of the following salts
      ℞ Sodium citrate 100 0 ℥xxv
      Calcium chloride 3 0 gr vi
      Sig 2 Gm (30 gr or ½ tsp) in 1 glass water t i d
2. Alkalinizing urine The urine should be maintained at a pH greater than 6 0 with sodium citrate or sodium bicarbonate 1 2 Gm (15 30 gr) q i d This is done to help prevent cast formation in the collecting tubules
3. Hospital treatment As uremia becomes more marked and acidosis more profound nausea and vomiting develop it is generally necessary to place the patient in the hospital in order that the electrolyte balance may be adjusted as needed with I V fluids (see page 23) Uremia must also be treat d (see next page)

HEALED GLOMERULONEPHRITIS

Any patie t who h s h d an attack of acut glom rulon ph itis has undoubtedly suffe d pe mane t d stru tion of som of th nephrons The lesion is said to be healed whe the is no long r any evide of activity and the numb of remaining fun tioning nephrons is great nough so that no impairment in fun tion o struc t e can be found How r th e i no w y of estim ting how many nephrons thi may b It is lway possibl that the numb *functioning is barely uffi ient to sati fy th ver ge d mand of* the body

F llow p C

Sub q t bus may a se suff cie t dditi al n phron dam ge to bring about a l te t glom ruloneph itis Pati ts with h al d gl m rulon ph itis m st th f re ubmit to a mod t b t ot necessarily rigid p otein r t iction and h uld have u i e e minations at l ast onc a year f life

UREMIA (code No 551)

Ur mi is a physiologi al st t sulting from r l insuffi i ncy which m y be d fin d as an lt ration in lect olyt balan with re tention of nitrog ous and other waste p od cts Altho gh r mi is most f equ ntly se n in th t rmin l ph se of chronic r n l dis se it does not n c ssarily imply an e ly d mi som c s of u mia m y ct lly be d e g thos r ulting f om in y reten tion secondary t ob t uction In the man gem t of uremi on should r m mbe th t th alter tions in l ctrolyt b lance re more important than the elevation of th N P N and that th r py th f hould be aimed p im rily at p eventing and t ating th cid osis whi h dev lops

P thologi l Phy iology of R n l Ins fi i y

A R l Def t

1. Gl m rul r filtr tion i d pres d and p od an el vation of th serum N P N phosphorus s lf t and othe id radi als this l d to met bolic a ido is (see p g 20) The s r m phosphoru ris s and the s rum cal ium t nd to f l
2. Tubul r function is dep essed and the kidney loses it pow r to manufact re NH_4 (whi h ons rves fixed base) this l ad t loss of the fixed ba es sodium pot ssium and c lcium, whi h f rth r contributes t cidosi (s pag 20)

B Gene l M t boli Eff ct Anemi develops gr du lly du appar ntly t bon marrow d p s ion Los of cal ium in urine with ons que t low rum c l ium and high s rum phosphorus l ads to p rathyroid hyperplasi phosphoru an not be e cr t d how ver and rem ins elevat d The serum p oteins m y become lowered

Di gnosi

T h ed phy i logy l a s to the linical m nif st tion of ur mia Thes a vari b la ly u emia ther may be letha gy

heads he *pruritus* and weakness Late uremia is characterized by acidosis and dehydration In addition tetany may result *from* lowered serum calcium and muscular weakness may occur if serum potassium is lowered The blood N P N sulfate and phosphorus are elevated the serum potassium is variable and the *serum sodium* calcium and CO_2 are lowered A normocytic anemia *is present* Coma is *superimposed later*

Treatment

A Early

1 Diet Protein must be restricted to 0 5 Gm /kg (0 23 Gm /lb) body weight plus the amount lost in urine This tends to reduce N P N and serum sulfate (see page 294)

2 Fluids and electrolytes Force fluids orally to 3 000 4 000 cc (3 4 qt) per day Give calcium lactate and salt mixture by mouth as for terminal glomerulonephritis (see page 300) This helps keep the electrolytes in balance

B Late

1 General measures

a Diet As above Protein restriction is very important

b Fluids

(1) Force fluids orally to 3 000 4 000 cc (3 4 qt) daily *unless patient is anuric*

(2) I V fluids and salts should be given as necessary to maintain normal electrolyte balance (see p ge 21)

c Electrolytes

(1) Continue use of salt mixture (see page 300)

(2) Aluminum hydroxide gel 15 cc (4 dr or 1 Tbsp) q i d orally aids in reducing the hyperphosphatemia (causes precipitation of insoluble phosphates in bowel) and *so helps to elevate serum calcium* and *prevent* tetany

(3) Calcium gluconate or lactate 10 cc (2½ dr) of 10% solution I V is useful p r n to prevent tetany

d Transfusions of carefully matched blood may be used to *control anemia All other forms of treatment* to combat anemia are without benefit

2 Complications of treatment In the treatment of uremia the physician is apt to encounter a therapeutic dilemma In the course of attempting to correct the electrolyte balance the *amount of sodium that must be administered may* cause the patient to develop cardiac failure Little can be don for the patient at this time he has almost no cardiac or renal reserve remaining

C Termin l

1 *Calcium lactate or gluconate 10 cc (2½ dr)* of 10% solu tion I V p r n to control tetany and convulsions

2 Magnesium sulfate 1 Gm (15 gr) (10 cc of a 10% solu tion) I V p r n for restlessness and convulsions Caution Have I V calcium salts r ady in syringe (see page 286)

3 Paraldehyde 20 cc (5 dr) in 30 cc (1 oz) of oil rectal ly or 4 8 cc (1 2 dr) I M as necessary for sedation

EXTRARENAL AZOTEMIA

Extr r nal a otemia i th abno mal umulation of nitrog nou wast p oducts in th pr n e of norm l or pote tially normal enal fun tion Th most common cause is a d reas d effective ci ulating blood v lum with inad quat glom rular filtr tion such as occu in shock dehydration etc The condition al o occurs in massive gastr intestinal bl ding wh re th is a sudden exce i prot in dige tion and ab orption plus de reased circulating blood volum

T e tm t

T tment is aim d entirely at th or ection of the und rlying condition ther i no r nal dis ase present Fl ids nd elect o lytes suffi ient to resto e the blood ch mistry to no mal hould b gi n

ACUTE RENAL FAILURE

(Lower Nephron Nephrosis code No 713 y00 9)
(Due to Hemoglobinemia Following Transfusion code No 713 38x 9)

Pathol gical Phy iol gy

It ha lly be demon trated that th cute re l f ilu e (liguri o a ria) which occu s in va iety of toxic conditions prese ts the sam lini l and pathological pictur ir sp ctive of th etiology Thi condition i m st oft indu ed by one of the following (1) int va ular hem lytl actions (g t a sfu ion e ctions) (2) rushing inju ies (3) burns (4) chemi al toxicity of s me types (e g arbon tet a hlorid sulfon mid s tc) (5) tox mia of pr gnancy and (6) non t aum tic m sc l r i hemia. Although the p thoge is is variabl the histop thologic pictur is the sam and on ists prim rily of focal d g ration of th distal convol ted tubul with blood ca ts in th l w r neph on and c l l cting tubule

In most mild to mod te e th kid ys will op n spontan ously in l t 14 d ys (if the pati t an be k pt live that long) In m r e ve e s s th r n l shutdown may be permanent Th vid nc s ggests that if the p tient urvive r covery is compl t and that complete h ling of th kidn y m y occur in hort a time s 3 to 4 weeks

Di gnosi

A P od of Shock At the onset symptom of shock m y be the on y findings H m pigm t m y be found in u ine

B P iod of R nal Shutdown (M y Last 14 or M re Days) The p ti t m y be ymptom t c but if th h tdown pe i is the m nife tations of ur mia will occur *Weight gain periphe-eral edema and the rales of pulmonary edema may be ound if the patient he been overhydrated due to over-treatment with fluids* Thi drowning i the most com mon c se of death

C P iod of R covery Th di sis which f low renal hutdown m y be m ked and uncont olled and may l ad to dehydr tion Muscular w kne s (du to low serum potassium) and tetany (due to low e rum al ium) m y occur The blood N P N

usually does not *return to normal until 2 4 weeks aft r initial* recovery of the kidney has occurred

Tre tm t

A *Emergency*

1 SHOCK Since many cases are associated with *traumatic or* burn injuries the renal ischemia associated with shock may play a role in the pathogenesis Immediate and vigorous therapy aimed at overcoming the shock is important (see page 31)

2 Immediate alkalinization of the urine in cases of transfusion reaction may help prevent the precipitation of acid heme compounds in the renal tubules Give sodium bicarbonate *5 10 Gm (75 150 gr)* orally at once check the *urine pH* every 1 2 hours and gi e suffi ient sodium bicarbonate to keep the urine alkaline

B Oliguric or Anuric Phase *The management of the patient in this phase is very difficult and should be carried out only by trained personnel in a hospital able to determine chemically the entire electrolyte panel* (See page 21)

1 Weigh patient a curately daily Weight gain means fluid re tention and this must be avoid d

2 Fluid restriction This is one of the foremost principles in therapy In the past pati nts were often drowned to death in an effort to promote diuresis Usually 800 1500 cc of *fluid is the maximum allowed daily If patient is not losing excess fluids (as by vomiting diarrhea or excess sweating* with fever) the insensible water loss is the only fluid which must be replaced This can be calculated as follows 0 6 Gm or 0 6 cc water/Kg (4 cc or 1 dr /15 lb) body weight *per hour or 15 cc water/Kg (7 cc /lb) per day* This may be taken orally If vomiting occurs the fluid may be given I V as 10 15% or more concentrated glucose given slowly and carefully so as to avoid infiltration The amount *given must be estimated clinically but under no circum* stances should the pati nt be allowed to gain weight (keep an accurate record of weight) for this probably repres nts fluid retention If patient is vomiting has diarrhea or is *sweating give add tional fluids to replace this loss*

3 *Electrolytes* Th electrolyte pattern should be examined daily and every attempt made to keep the electrolyte values within normal ranges Give electrolytes as needed orally or parenterally *Give calcium gluconate 10 cc ($2^{1/2}$ dr) 10% solution I V for convulsions*

4 Diet A high carbohydrate and high caloric diet without protein will prevent endogenous prot in breakdown and slow down the accumulation of protein breakdown products *(i e urea organic acids* and potassium) In the absence of vomiting a simple way to supply fluid and food is as follows Pass a small poly thylene plastic tube intranasally into the stomach Calculate the amount of fluid n cessary over *24 hours and to this add lactose and salad oil to give the num* ber of calories required for maintenanc This mixture may then be emulsified in a blender by adding 2 5 cc of Tween 80®

to the solution The volum is divid d int 24 p rts and ch portion i administered hou ly by syringe to the patient through th polyethyl tube If th patient is vomiting 50% or less concentr t d glu ose can be gi en by I V drip Vitamins should be given with the high CHO intak ither or lly or I V

5 Digitalization If any evid n e of a di c failur cardia enlargem nt o pulm nary edema develop imm di te rapid digitaliz tion and maintenan hould be ried out (s e p ge 197)

6 Diu esis If diure i ha ot occurr d by the 12 14th day it m y be n cessary to r sort to mo e d astic m asu s to combat th rising a ot mi Among those whi h have b n ad oc t d th artificial kidney is th best Th use of oral xchange resin i t tinal l v g and/or peritoneal irr g tion i diffi ult t car y out but mu t at tim s be used if an rtificial kid y i ot ilabl

C R ove y (Di etic) Ph The man g m t f th diur tic ph is l tively simpl A 24 hour u ine sampl is llected The pool d in is then analyzed f total odium and pot sium ontent The mount of el ct olytes and w t r lost p r 24 hours is th n r plac d ver th n xt 24 hou s This p ocedur i re peat d until renal f ctional i tivity has etu n d If th u in annot be saved then the pati nt ho ld h e d ily s un ha K and Cl d t rmin tions The fluid and lect lyt plac ment is d t min d on th basis of the m asu ments (s p g 21)

Diu i m y oc ur in on of three w y

1 Di i with le t olyt los Thi va i ty of di i i g ner lly char cteriz d by an tion of a g at ess f od um, hl ide and potas ium in th rine with pid fall f th e ion in the xt ll is fluids It m y be n s y to give 20 30 Gm (2/3 1 oz) f odium hlo id pe 24 hou to ompen t f this los Unl s thi don d th m y ult f om hypochlor mi and dehyd tion Potassium chl rid m y l o have t be give

2 Di is with el t olyte t tion In the p tient the appear to be an nom lous ondition of the ren l t bul in whi h odium nd chlo id ar ab orbed in e ss in i tion t wat In thi ondition the is pid ri in rum N and Cl with the on t of di r i The py the f onal is of imm diate r tri tion of N and Cl and the forcing of salt f ee fluid

3 Diure i with norm l l t lyt loss

F llow Up

Whe ecovery i compl t no f rthe t ment is n ry

INFECTIONS OF THE URINARY TRACT

Inf ctions of the rin ry tract m y involve one or mo part of th syst m and may be ithe h onic or acut Women re more p on than m t inf ctions of the ina y t t and in, tion a e quit common du ing pregnan y E he ich.a li by far the most f equent invading organi m but othe pyog

organisms may also cause infection The diagnosis is usually suggested by the presenting symptoms and signs and is confirmed by the microscopic examination of the urine sediment and bacteriological examination of a *sterile urine specimen*

A chronic or recurrent infection particularly if resistant to antibacterial agents suggests obstruction and *urinary stasis* The final clearing of such infection is dependent upon the correction of the obstruction

General Principles of Treatment

A Correction of structural abnormalities which produce stasis is of utmost importance in cases with remediable defects urinary tract infections may disappear spontaneously or be easily cured as soon as the defect is corrected The permanent eradication of infection in the presence of such obstruction is usually impossible The diagnosis of obstruction usually requires cystoscopy and/or excretion or retrograde pyelography Treatment is generally surgical

B Treatment of the infection with suitable chemotherapeutic or antibiotic agents as determined by bacteriological studies

1 Careful examination of fresh sterile urine specimen (2nd glass specimen in male catheterized specimen in female) for presence of pus and Gram s stain for preliminary identification of organism

2 Bacteriological identification of organism and determination of sensitivity of organism to antibiotic agents whenever possible The latter is of special importance when streptomycin Aureomycin® or Chloromycetin® are to be used because adequate dosage must be assured to eradicate infection before organism resistance develops (see page 514)

INFECTIONS OF THE KIDNEY

Diagnosis

The manifestations of all infections of the kidney are similar but they vary in intensity with the severity of the infection Symptoms include lumbar pain which usually radiates into the lower genitourinary tract but may radiate elsewhere chills fever and *nausea and vomiting* as well as *frequency urgency* and dysuria There is usually moderate to *marked costovertebral angle tenderness* Examination of a sterile urine specimen for pus and organisms is necessary to make the diagnosis and to select the proper antibacterial agent

A Pyelitis (code No 722 100) Simple infection of the renal p l vis which does not affect kidney function

B Pyelonephritis (code No 719 100) Renal infection which depresses kidney function and which in the chronic form may produce effects similar to those of chronic glomerulonephritis

C Pyonephrosis (code No 722 100 2) Renal infection of greater *severity than pyelon* phritis with pus in the renal pelvis

Renal and perirenal abscesses are surgical *diseases of the* kidney

Treatment

A. Specific Measures
1. Antibacterial therapy should be given as soon as causative organism is identified and as soon as sensitivity tests have been conducted to determine dosage (see page 514)
2. Surgical treatment of any remediable obstruction should be carried out when the acute symptoms have subsided. Diagnostic studies of the urinary tract should be deferred also until the acute phase has passed

B. General Measures
1. Bed rest until completely asymptomatic
2. Fluids. If the kidney function is not depressed and there are no other contraindications fluids should be forced. Maintain daily urine output of 1500 cc or more
3. Analgesic and sedative as necessary for the comfort of the patient

C. Treatment of Chronic Pyelonephritis. There are cases of chronic pyelonephritis in which the kidney has been modestly or markedly damaged. Infection in these kidneys is very difficult to eradicate. Addis suggested the continued use of small doses of a sulfonamide drug 100 200 mg ($1\frac{1}{2}$ 3 gr) t i d q i d (after other measures have been taken to eradicate the infection) in the hope that the small doses might stop or slow down the progression of the disease. Once this therapy is begun it should probably be carried on for life.

Terminal pyelonephritis is handled the same as terminal glomerulonephritis (see page 300)

CYSTITIS

(Acute code No 730 100) (Chronic code No 730 100 0)

Diagnosis

Inflammation of the bladder is many times more common in women than in men and is most commonly due to Escherichia coli. It must be differentiated from urethritis which has similar manifestations

A. Symptoms. Mainly dysuria urgency and frequency. If severe there is tenesmus and at times urinary retention. Chills and fever may occur. When infection is very severe hematuria may develop

B. Signs. Suprapubic tenderness may be present

C. Laboratory Examination
1. Organisms and pus will be found in the urinary sediment of a properly collected specimen
2. Organisms must be identified by examination of stained smears (methylene blue or Gram stain) and by culture for proper selection of the antibacterial agent (see page 514)
3. Two-glass test may be used to differentiate urethritis from cystitis in the male. Examine the urine grossly and microscopically. If the urine in the second glass is clear the infection is in the urethra. If all urine is turbid, the bladder is infected (Use 3 colorless beakers or glasses)
a. First glass consists of 4-8 cc of urine and contains the elements from the urethra

b 'Second glass contains the remainder of the urine from the bladder
c A third glass may be collected after prostatic massage In this method the patient must retain some urine in the bladder to wash out *any residual material*

D Cystoscopy May be necessary to determine the presence of obstruction upper urinary infection or source of bleeding This must not be done during the acute phase

Treatment

A Specific Measures
1 Antibacterial agents Select the appropriate drug by bacteri *ological examination and sensitivity tests* *(see page 514)*
2 Surgery Correct any remediable obstruction after the acute stage has subsided

B Gen ral M asur s
1 Bed rest if severe
2 Fluids If urination is painful fluids should not be forced When dysuria has subsided maintain a *high urine output*
3 Bladder sedatives and analgesics
a For *severe pain* Mild local *anesthesia can be obtained* by bladder instillation of 2% solution of Metycaine Hydro chloride® or 1 1000 (0 1%) solution of Nupercaine® Allow the anesthetic to remain in the bladder for 10 minutes by placing a clamp on the catheter After drain ing off the anesthetic instill 10 cc of 5% solution of mild *silver protein or* 1 10 000 silver nitrate solution and leave in the bladder
b For tenesmus Treat as for dysuria (see *page 292*)

TUBERCULOSIS OF THE URINARY TRACT
(Kidney code No 710 123) (Bladder code No 730 123)

Chronic tuberculosis of the urinary tract usually occurs first in the kidney and involves the bladder secondarily *A history of* bladder irritation is usually present the urine contains pus and a few r b c but there generally are no organisms The urinary sediment must be examin d microscopically and bacteriologically *(culture and guinea pig inoculation) for acid fast bacilli If tubercle* bacilli are found determine the primary urogenital *site of the infec tion and whether renal* disease is unilateral or bilateral

Tre tment

A Treatment of renal tuberculosis with the *newer* anti tuberculous chemotherapeutic agents stops progression and may *effect* cures in some cases Therapy is the same as that advocated for pulmonary or other systemic tuberculosis *The use of inter* mittent streptomycin plus para amino-salicylic *acid for long periods of time* (1 to 3 years) has been used most *extensively 1 Gm (15 gr) streptomycin* (or 0 5 Gm streptomycin and 0 5 Gm dihydrostreptomycin) *every 3rd day* and 12 Gm (3iii) PAS daily in divided doses *seems to* be an adequate schedule

B Surgery *If unilateral tuberculosis is found and if the* kidney is seriously involved nephrectomy with subsequent streptomycin

therapy hould be onsid red This would appear to help to cure any lowe tract tuberculosis that may be pres t

C Symptomatic and supportive mea ures as n ce ary

OTHER DISORDERS OF THE URINARY TRACT

CARCINOMA OF PROSTATE
(Adenocarcinoma code No 764 8091)

Diagnosis

Th ast m jority of p ostatic arcinomas can be di gnosed by th finding of a hard gland or ar a within the gland on ctal exami nation Confirmation of th diagnosi is m d by ne dle biopsy and the finding of an levated cid serum phosphatas X r ys of th pelvis and lower spin are tak n to determin the pr s ce f metastases

T tm t

A E ly Cas s Treatm nt of choi e is r di l surgical removal This is r ved only for ases in which (1) there is no evid n e of met stases (2) th gland i ot fixed to surrounding tissue (3) the patient is otherwis a good su gical isk and has a good lif xpe tancy

B All Oth C

1 Hormon ther py Th estrogens h ve be found to be of great be fit in reli ving the pain as ociated with met tas s and in arresti g th p ogr ss of the dis (in s m ca actually causing a regr ion) Th wide t xperienc has be n g ined with Di thylstilbestrol U S P Stilbestrol, B P and Ethinyl Estradiol N N R

a Dosage

(1) Averag maintenance dosag Di thylstilbe t ol 1 mg (1/60 gr) o thinyl estradi l 0 1 mg (1/600 gr) per d y orally fo lif

(2) If no or poor re pon may increa e as follows Diethylstilbestrol 2 3 mg (1/30 1/20 gr) or ethinyl e tradiol, 0 2 0 3 mg (1/300 1/200 gr) per d y

(3) Some authorities feel t th ors t of th py one should give di thylstilbestrol 5 10 mg (1/12 1/6 gr) or ethi nyl estradiol, 0 5 1 0 mg (1/120 1/60 gr) per day

b Toxi igns

(1) N us a and vomiting may occu but usually disappe r s the drug is continued If s ver diminl h do ag and increase as toleranc develops

(2) P inf l and enlarged brea t usu lly develop on con tinued dos g but this is no contr indi ation to con tinued the apy

2 Or hi ctomy The results to date gge t that bil te l orchi ctomy plus strogens i of great val than stro gens alon

3 General upportive m ure such as surgic l r mov l of a prostati urinary ob truction et should be employed

4 Bilat ral or hiectomy nd adrenale tomy (with cortisone and estrogen m intenance) in ord r to move a l possibl

androgens must still be considered experimental To date the results in most cases seem little better than orchiectomy *plus estrogens alone*

UROLITHIASIS

(Renal Calculus code No 719-615) (Ureteral Calculus code No 723-615) (Renal Colic code No 711)

Renal colic is usually caused by the passage of a renal calculus into and down the ureter It is characterized by a sudden onset of severe pain in the lumbar region of the affected side radiating to groin bladder testes inner thigh, or to other adjacent areas The pain requires narcotics sometimes in large doses for relief Nausea and vomiting may occur but no other constitutional symp toms are present unless there is a pre existing infection Urine output is reduced and hematuria is commonly seen Some stones may pass without symptoms

Treatment

A EM RG NCY M ASURES

1. Narcotics *for relief of* pain These may have to be repeated if pain is severe
   a Morphine sulfate or hydrochloride 15 mg (1/4 gr) I V or subcut Stat Atropine sulfate 0 5 0 75 mg (1/120 1/80 gr) may be given with the morphine
   b Meperidine Hydrochloride Injection U S P (Demerol® Dolantin®) 0 100 Gm (1 1/2 gr) I M or orally in place *of morphine* This has a minor atropine like effect in addition to its narcotic action
2. Heat over the affected flank and lat ral abdominal area may give some relief This can be given as warm moist towels heat pad or warm tub bath

B General Measures

1. Fluids If patient does not develop anuria or oliguria fluids should be *forced* in order to maintain a high urine flow Fluids should be given I V if vomiting prevents oral admin istration Any individual who has had a renal calculus should be encouraged to drink large amounts of fluids at all times
2. Check *carefully for passage of stone* If this does not occur patient should be examined by x ray for position of stone
3. Attempt to recover stone by having patient void through a *funnel* layered with several thicknesses of gauze

C Surgery If a stone becomes lodged in the ureter *it should be* removed surgically to prevent hydronephrosis

D Coexisting infection should be treated with suitable antibacterial agents (see page 514)

Prophylaxis

A Correction of Underlying Disease Treat any disorder which may cause or assist stone formation These include *hyper parathyroidism* (*see page 377*) *urinary* obstruction and uri nary infection (see page 306) *Every patient with urinary tract calculi should have at least one serum calcium and phosph rus determination to rule out hyperpara-thyroidism*

B Fl ids Any patient who has had a *renal* calculus must be en couraged to drink large amounts of fluid at all *times*

Chapter 12

DISEASES OF THE MUSCULOSKELETAL SYSTEM

INTRODUCTION

Cl ific tion of Rh m tic D ase

1. A th t s d t pecif inf t on cute or chroni
2. Arth itis due to rh matic fever
3. A thritis h um t id
4. Dege r ti e joi t disease
5. A thritis d t di t t m
6. A thritis due to gout
7. Othe arthrop thi (d to u g ni eoplastic m t boli ascular hem t g ou all gi t ic nd un known e)
8. Fibr s tl myositis bu itis

E mi tion of th P ti t

Th xaminat on f the p ti t with he m ti dis ase should incl d a caref l hist ry and phy i al amination with pe al mph si on d termining the f ctional st t s of the joints (a g of motion a kylosis d formity atrophy tc) Routi e labo to y t d a blood s dim nt tion t and x ray of one or mor of the involved j i ts e ess ti l to complete th diagnostic pictur Add tional st dies may include d termination f th blood u ic a id aspir tion and amination of joint fl id d lt l imm no logic and othe test f r spe ific infe tion The t d r important not only from a di gno tic standpoint b t als ser e to pro ide a b a line f planning the therapy and evalu ting the lini l p ogr ss of the patie t

The diff re ti l diagnos of the 4 m jo forms of arthriti are t be found in the table on p g 312 and 313

RHEUMATOID ARTHRITIS (code No 24 1 0)

Rheumat id thritis (o p efer bly heum t id d e) is hroni disabling y t mi dis ase of undet mined igin It is ordinarily onsid r d as invol ing p ima i y the joints but it is a t lly c pable of involving most of the tiss s of the body parti larly thos of m sod mal origin, in lud.ng lymph nodes bon marrow liver pl n, ga troint tinal tract ent l ne vous yst m y s peri ardium kidn ys connecti ti s ie nd the musce ture The di as may invol any or a l joints and is of y.ng s verity P lartic l r w lling is p omine t in the

DIAGNOSTIC CHARACTERISTICS OF THE MAJOR FEATURES OF ARTHRITIS

	Rheumatoid Arthritis	Arthritis Due to *Specific Infection*	Degenerative Arthritis	*Arthritis Due to Gout*
Family history of similar condition	+		+	+
Past history	Frequent infections	*History of specific* infection		
Sex	Most common in women	Either sex	Both sexes	Usually men
Age at on et	Any age usu lly 20 50	*Any age*	Usually over 40 y ars	Usually over 35 year
General physical status	Poor undernourished	Acute good Chronic may be poor	Good but may show other s nile chang s	Good
Type of ons t	Insidious (subacute)	Acute infection sudden *Chronic inf ction slow,*	*Insidious (slow)*	*Sudden (cessation of* symptoms also sudden)
Fever	+	+ (esp cially acute)		+ (during acute episodes)
Joints in olved	Any joint often sym *metrical* with tendency to spread centripetally Proximal finger joints *especially* involved	Any joint pyog *nic* forms are usually monarticular Non pyogenic forms are *often polyarticular*	*Usually the large and* weight bearing joints Also distal joints of fingers	*Any joint* monarticular or polyarticular Especially involves metatarsopha langeal joint of great toe
P riarticular swelling	+	+		+
Ankyl is	+	+ (pyog nic)		
Mu le atrophy	+	+		+ (late)
Deformitie	+	+ (pyog nic)		+

Cutaneous changes	Skin over joints atrophic and glossy	Similar to rheumatoid arthritis	Senile changes	Early: None; Late: Similar to rheumatoid arthritis
Subcutaneous nodules	+			+ (tophi)
Anemia		(early) (chronic) ±		
Leukocytosis				± (during acute period)
Blood sedimentation rate				+ (during acute periods and chronic phase)
Hyperuricemia (blood uric acid)				+
Character of joint fluid	Non purulent (turbid)	Purulent to non purulent (septic)	Non purulent (turbid)	Non purulent (turbid)
X-ray appearance of joint	Early: Generalized decalcification of bones and joint effusion; Late: Narrowing of joint space, bone destruction, ankylosis	Similar to rheumatoid arthritis but bony decalcification more prominent in involved joints	No changes until late; lipping, osteophytes and narrowing of joint space	Early: Normal; Late: Punched out appearance
Specific therapy	Peripheral: Gold salts; Spinal (spondylitis): x-ray	Specific anti-infectious agents	None (? [illegible])	Colchicine
Other diagnostic features		Bacteriological and immunological evidence of specific local or systemic infection	Some clinicians include menopausal arthritis in this category. Estrogens are of value in cases of gonadal deficiency	1) Early in disease between episodes patient is asymptomatic and there is no residual joint involvement 2) Tophi: Contain urate crystals

peripheral joints early in the disease and ankylosis and deformity are common end results

Diagnostic Features

A. Clin c l M nif tations (See also the table on page 312 313)

1. Non articular manifestations include weakness anorexia fever weight loss clamminess of skin muscular aches and tremors iritis migratory pleurisy lymphadenopathy anemia and involvement of any of the other above mentioned *body tissues*
2. The acute form of the disease is rare but may run a severe fulminating course associated with high fever chills cachexia and a rapid death
3. Mild or transient types of rheumatoid arthritis may occur
4. Although certain joints are classically involved any or all joints may be involved Joint involvement may be monartic ular but this is rare
5. In rheumatoid arthritis of the spine (rheumatoid spondylitis) the patient may or may not be otherwise healthy but will develop recurrent low back pain associated with progressive stiffness of the spine and reduced ch st expansion often without significant invol ement of the peripheral joints

B. *Laboratory Data*

1. In reased blood sedimentation rate and less commonly leukocytosis are considered to be evidence of clinical activity
2. X ray changes of joints and periarticular structures may be quite characteristic (see page 313) and helpful in differen tiation from osteoarthritis although osteoarthritic hanges may occur coincidentally in rheumatoid arthritis and ther by confuse the picture

   Narrowing of joint spaces and ankylosis of the sacro iliac and apophyseal joints and calcification of the anterior and lateral spinal ligaments may be demonstrated in rheumatoid spondylitis

Treatment.

A. G neral Me sures

1. Rest
   a. Acute illn ss Complete bed rest should be reserved for the patient with the acutely active or severe rheumatoid arthritis Special care including exercises should be used to prevent deformities in bed patients and the af fected joints should be placed in the optimal functional position
   b. Mild chronic illness 1 2 hour rest periods during the daytime as well as 10 12 hours rest in bed at night are essential Analgesics and sedative drugs (not narcotics) and physical therapy may be used j diciously to insure relaxation rest and sleep
2. Physical activity Carefully regulate the daily schedule of activities of the patient and allocate periods for work play and exercise as well as for rest
   a. Ambulatory patients It is usually necessary to specify the hours and physical limitations for ambulatory patients according to the demands of the individual case

b B d pati ts It i imp tive to institute a p ogram of daily sy tematic ercises t p ve t joi t stiffn s and muscle atrophy R fe to the secti on physic l manage ment of arthritic joi ts (see pag 323)

3 Di t Food should be simple nou ishing and palatable An adequate protein and high vitamin diet i us ally ad isable Si g st ount ti l disorders ar f quent in rh umatoid arthritis it is often n ces a y to modify th di t to t le ance C lo i sho ld b incre s d or decreas d according to the p tient s w ight

4 Di tary suppl m t

a I on salts may be indicated if anemia is pres nt (e page 219)

b M ltivitamins The u e of a cept ble multivitamin prep arations as a g n r l health building me sur may be in di ted although it is prob bl that no on of the vitamins has spe fic therapeutic ff ct on this ondition Vitamin D High poten y vitamin D p parations in d ily dos g ranging from 50 000 300 000 unit in divided doses h e be n populariz d a being f great val e Toxi ity of thes vitamin D compounds in pr longed or excessi e doses is definite and their effecti e es has be n ques tioned by many inv stigato s Oth r individual vitamins have fall d to d mon trate signifi ant be fi i l res lts

5 Elimination of p ecipitating factors

a Inf ction E aluate the role of syst mic or f cal infec tions only as th y m y pply t th individual patient Eliminate pe ifi inf ctions whenever possible D finit ly inf cted t th tonsils etc may be r moved or tr ated s indi t d It is best t m int in a cons tive attit d t ward the elimination of qu tion ble focal infections pe ially wh n their orr ction will involve extensive or majo urg y Anti inf ctive ag ts should be given only to combat specific infection and not the heum toid dis per s

b Psychogenic f cto s Freque tly rheum toid dis s has it on t when the patie t is w rking nd living in h a si g tmo phe e wh r he is subj t to undu an ieties hostilit s or entiments

c Imp ope li ing hygi Fo correction of s ch f ctors see sections on r t physic l activity and di t (above)

6 Psychother py

a Rea su e p tient and li e existing an i ti

b R gulat pati nt s environm nt to minimi emotional dist ss

c Keep an optimi ti and cheerf l attit de

d Explain the ature of th di ase and the rol the p ti nt hims lf pl ys in over oming his illne

e Enlist id of a t ained p ychi trist in appropriate ca s

7 R li f of p in *Avoid narcotics*

a Analg sic drugs Give analge ics liberally if tole t d to r lieve pain as an aid in pr venting m le spasm nd deformity

(1) Sodium salicylat 0 6 Gm (10 gr) (t i coated to p event gast i di tres) every 2 4 hours p r n pain

(2) Aspirin 0 3 0 6 Gm (5 10 gr) every 2 4 hours p r n pain

(3) Analgesic sedative mixture

℞ Sodium salicylate 10 15 ℥iss iv

Elixir phenobarbital q s ad 120 ℥iv

Sig 4 cc (1 dr or 1 tsp) every 4 hours p r n

b *Sedative drugs* Barbiturates can be used effectively in enhancing the action of the analgesic drugs Pheno barbital 15 30 mg (¼ ½ gr) 3 4 times daily

c Physical therapy Physical methods *utilizing local heat* to involved joints and proper splinting are effective in re lieving pain and muscle spasm (see pages 323 334)

d X ray therapy is of no value in peripheral joint involve ment *of rheumatoid arthritis* in rheumatoid spondylitis however deep or penetrating x ray therapy carefully administered in repeated courses has proved to be of value This treatment must be administered only by trained x ray therapists

B Hormone Therapy The hormonal and steroidal agents which are used in the treatment of rheumatoid arthritis although *representing a significant advance* must be considered as only ancillary measures to the comprehensive approach to the treat ment of this disease Perhaps the greatest disadvantage which might stem from their use aside from the very serious prob lem of untoward reactions lies in the tendency of patient and physician alike to neglect the less spectacular but proved bene fits which may be derived from general supporti e treatment physical therapy and orthopedic and *other measures These* agents do not represent the long awaited specific anti rheumatic factor and do not cure the dise se

1 Cortisone acetate and hydrocortisone produce startling re sults in acute rheumatoid *arthritis* but *unfortunately* wh n the drugs are discontinued the condition regresses quite promptly Subjective improvement may be experienced with in 6 48 hours after the initial dose but objective changes such as increased mobility of joints and diminished joint swelling occur more slowly and less constantly The period of remission following discontinuation of these drugs may vary *from a few days to a few months It would seem that* the principal indications for hormonal therapy in rheumatoid arthritis are for the control of the acute exacerbations of the illness and the prevention of rapid progression due to exten sive inflammatory reaction Optimum dosage schedules have still not been established although it would now appear that satisfactory results can be obtained with smaller or more *conservative* doses than those employed previously It is recommended that initial doses of 75 100 mg (orally or by injection) daily be used until adequate control *is achieved* Maintenance levels of 25 100 mg daily may be continued in some cases indefinitely Some *observers feel that rest* periods of 1 month *between the* 4 6 week courses are advis able However the drugs have been employed contin ously now in many patients for several years without apparent harmful effect (see pag 423 for further discussion of phys iology dosage toxicity etc of cortisone)

2 Corticotropin (ACTH) Striking r sults similar to those obtained with corti one have been reported (F r recom m nd d dosage s pag 423)

C Gold The py (Chrysoth r py) Although g ld salts have be n u ed t nsi ely in heum toid arth itis th ir v l e r mains highly ontroversial

1 Indication Gold th apy is indic ted *for active rheumatoid arthritis only* Some clini ians fe l th t it should not be us d until a sonable trial of cons rvativ mea u s has fail d to achieve the d sired r sults oth rs feel that the chances for complet r mi sion may b bett r if gold th r apy i used e rly in the disease

2 Contraindi ations *Nephritis hepati insuffi i y blood dys r sias* (i cluding anemia) h morrh gi tend i s p gnan y trong person l history of alle gy or all rgi s se ere diabete m llit s a t g nerali d skin dis rde lcer tive colitis cute rh um ti fever and t be losis

3 Prep ations and dosag Th gold s lts a e ually give on a week beginning with m ll dose indi at d bel w Th w ekly do e is in e sed gradually until th ma imum optim l do is being giv this amou t is th ontin ed weekly until th d sired respon is obtain d the maximum amount is gi en o t xi reactions occ r On or two or mor urses of 1000 to 2000 mg of g ld salt give with t of 2 6 months betw n cour s The v lue of the m int an dos i sm ll r dos at regula int r al is undete mined ven among s dent supporte of chry otherapy although many w k ra re employing this plan at pres t

GOLD PREPARATIONS

Pr paration	Route of Inj ction	Gi n One Do E h W k: First W ek Dosage	Amount of Inc p r Week	Optimum Ma imal Weekly Dose
Gold Sod um Thiosulfate (37% gold in queous solution)	I M o I V	5 mg	5 mg /w k	Fem l 50 mg Males 75 mg
Gold Sod um Thiomalat (50% gold in queou lution) Gold Sodium Thiogl ose (50% gold in oil uspension)	I M only	10 mg	In r to 25 mg in 2nd week if tol ted, incr to 50 mg in 3 d w k	50 mg

4 To ic re ction An ave ag of 37% of patien s (range in various s ries 8 61%) xpe ience to i re ction The mortality r te is bout 0 4% The toxic eff ts of b yeo ther py imila to those of othe he vy m s notably rea ic (se page 535) and inc ude derm t tis (mild to e foliat ve) agranu ocytosis purpura, hepa itis it itoid

reactions bronchitis aplastic anemia peripheral neuritis nephritis and photosensitization

a Reduction of *frequency and severity of toxic reactions*
  (1) Observe for the contraindications mentioned above
  (2) Observe patient carefully during the course of gold therapy and *for a period of several weeks thereafter*
    (a) Complete medical examination prior to therapy
    (b) Before each subsequent injection ask patient how he has felt since the previous *injection examine the* skin and mucous membranes for dermatitis or purpura and examine the urine for albumin and microscopic hematuria
    (c) Every 2 weeks obtain Hgb WBC and differential
    (d) When indicated perform special tests s ch as platelet counts or liver function tests
  (3) Warn pati nt against exposure to strong light
  (4) *Withdraw* drug immediately if any toxic reactions appear Wait for a few weeks if reaction is mild and clears promptly treatme t may be resumed with small doses
  (5) There is no known method of decreasing the tende cy to toxicity in a given individual except perhaps through reduced dosage

b Treatment of toxic reactions
  (1) *Withdraw* drug immediately if early toxic reactions appear
  (2) Treat reactions as for arsenical poisoning (see page 536)
    (a) Try BAL® on all cases (see page 536)
    (b) For treatment of agranulocytosis see page 231

c *Mask d toxicity If gold salts are used during hormonal* therapy a toxic reaction may b m sked appearing with explosive violence when the hormones are stopped *Therefore use gold salts with great* ca tion *during* hormonal therapy

OSTEOARTHRITIS (code No 240 912)

A chronic degenerati e joint disease of undetermin d cause usually of late adult life associated with varying degrees of symp toms and/or disability of multiple joints Ankylosis of joints does not take place except in the spine

Diagnostic Feat res (See table on page 312 313)

A Th d s a m y exist with a complete absence of symptoms when symptoms are present they are usually mild

B Joint Symptoms In lud
  1 Stiffne s which improves with mild activity
  2 Aching and pain *aggravated by o ra ti ty or inj ry* and relieved by heat rest and immobilization
  3 Swelling usually without joint effusion
  4 *D formity and malalignment occurs* s a res lt of irregular deg neration

C S condary Symptoms Radicular pains occ r when joint changes

in th spine cause irrit tion of the spinal nerve roots

Tr atm t

A Ge l M s Most of th ge e l mea s di c as d fo th tr atment of h umatoid arthriti ar appli able h ls Empha is m st be pla d upon

1 Adequate di t with total calori s adj t d to m et the p ti t s body n ds W ight reduct on is very important in obe e p ti nts to h lp diminish stre on joints
2 Adequate re t and l p Avoidan e of verfatigu is especially important
3 A idance f phy ic l activity which would ca e undue trauma to joints
4 Cor ct posture (ee p g 333)

B Drug

1 S li ylates re indi ted for th lief of pain a in the e of rh umatoid a th itis (s page 315)
2 Thyroid ext ct may b indi t d in th se pati ts who h ve coe isting hypothyroidi m

C For loc l t tm t of joi ts e p g 323 Compl t r st and immob l at on of in lved joint f hort p iods may be in stit t d without fear of ompli ating ankyl sis lthough one m t consider other harmful eff ts of bed st in such p ti nts (s e page 2)

TABLE OF DIFFERENCES IN RESPONSE TO THERAPY

	Rh um t id Arthriti	Ost oarthriti
Rest	Complet r t and im m bili tion atte ded by dang of ankylosis	Complet rest d im mobiliz tion f j ints a e ofte indicated for variable pe iods Little dang r of arkylo is
E tis	E n m ld xe p d di mf rt in the cut phase f th disease	Mild l de as tiff e s and d s omf rt, but und e e ise t iff e
M g	Light mas g ove the joint m y be indicat d in the conval sc t or h oni di	M g hould be void d di ctly ov th bony overgrowths of th i volved joi
Ch ysothe py P ripheral J int	Oft n ffective	No r pon Not indi ted
pine	ponse N t indi ted	r r ted
X ay th apy P ipheral J in	No re ponse	Sometimes ffecti e r li f of pai
S in	O n ffec ve lief of pain	U ua ly ou

GONOCOCCAL ARTHRITIS (code No 24 103)

A specific infectious arthritis caused by Neisseria gonorrheae (gonococcus) occurring as a secondary complication of primary infection of the genitourinary tract or conjunctivae

Diagnostic Featu es

History of previous genitourinary or ocular gonococcal infection and possibly of genitourinary trauma *Rheumatoid arthritis complicated by unrelated gonorrhea occurs more commonly than gonococcal arthritis per se*

A Bact remic Pha e
   1 Fever Mild to moderate Occasionally chills
   2 Laboratory findings
      a Leukocytosis Mild (10 000 15 000)
      b *Blood cultures* Rarely positive

B Arthritic Phase (Joint T ndon and Bursa Involvement)
   1 Early Evane cent polyarticular joint involvement of 3 7 days duration Joints red warm swollen and painful
   2 Late Knees (74%) ankles (56%) feet (32%) wrists (16%) most frequently involved joints
      a Joints initially red warm swollen and painful
      b Ankylosis may occur in untreated cases
   3 Laboratory findings
      a Gonococcal complement fixation test Doubtful v lue especially if positive since positive complement fixation tests are known to persist many years after genit l infections
      b Cultures of synovial fluid with special culture media ar the most reliable method of diagnosis but are difficult to perform

Tr atm nt

A Gen ral Mea u s See general measures a discussed in management of rheumatoid arthritis (page 311) and physical measures in the management of the acute phase of involvement of the various joints (page 323)

B Specific Treatment Penicillin 25 000 50 000 units I M *e ery 3 hours for 7 10 days* If improvement is not apparent in 3 4 days give intra articular injections of penicillin 10 000 20 000 units daily into the larger involved joints

BURSITIS

(Due to Infection Acute code No 25 190
Chronic code No 25 190 0)
(Due to Trauma Acute code No 25 4x0
Chronic code No 25 4x0 0)
(Due to Unknown Causes code No 25 930)

Bursitis is an acute or chronic inflammation of any of the nu merous burs e of the body it may result from traum acute or chronic infe tion or from unknown caus s Localized pain tend r ness and swelling may be observed at points around jo nts cor es ponding to anatomic bursae Pain and limitation of m tion of

adj c t joints are common Enlarg ment and calcifi ation of bu sae m y be demonstrat d r diologically t times

A Ge al M es Analgesics (s e pag 36)

B Loc l M u s

1 R t and pport of inv lved ar a by slings splints bandages etc
2 Loc l h t r cold Topical appli ations (e pag 327)
3 P ocain hyd ochlo id sol tion 0 5 2 0% injection
4 Hyd ocortisone ac tat (Compound F) 15 mg has be n r p rt d to pro id r li f of cute bu itis wh n inject d l c lly into the b s
5 Aspi tion of fl id f m bursa Fluid should be examined
6 X ray th rapy in elected s s (by spe iali t)
7 Surgic l r m l in s le t d ca

FIBROSITIS OR FIBROMYOSITIS
(Periarticular Fibrositis code No 24 x40)
(Chronic Myositis code No 27 190)

A l ge loosely defined group of ac t o chronic inv lvem nt of sub utaneous tis s fibr s tiss s of muscles and j int c p s l fasci l lig m ts t don and fib ous onn ctive tis ues of c tain p ipheral n r es due to a wide variety of us s most of which a ot accurat ly d termi d The cond tion may be mani f sted by pain t ndern or tiff of any in olved portion of the body Clinic l and l borato y finding s e minim l or abe t

A Ge ral M asu e

1 Elimin te agg a ting fa t
2 Re t See s tion on phy i al manag m nt of j i t di e e p g 323
3 An lgesics (page 36)

B Loc l M

1 Loc l h t (p ge 327)
2 Procaine hyd ochloride 0 5 2 0% in ction i to trigg er as (Of doubtful val)
3 X r y therapy (by peciali t) in s l ct d as s whi h f il to espond to oth the apy
4 M s ge and gr ded e s may be v luabl
5 St t hi g of the in lved t uct res pr c ded by local h at or ld by p ocaine l filtr tion may give compl t li f i one t tm t If only p ti l relief is obtained, the p oc d re m y be r pe t d d ily

GOUT (code No 010 741)

A d ase of unknown etiology ha t ri d by r ring ... itis due to depos ion of so... m ur te in the r and pe rt ul ti ue w ll as in soft ti as throughout the body R cur t ttack of acute arthritis, eparated by com ... is lmost pat gnomonic of gout, and the finding of t... is diag o t An e d b ood uri a d l vel

is very common even in asymptomatic periods *X ray evidence of* punched out areas about the joints is almost diagnostic but this occurs late

Treatment of the Acute Attacks

A Specific M asu es

1 Colchicine U S P B P *is the drug of choice* It should be given as early as possible in the acute attack or during the prodromata to obtain maximum benefit Give 0 5 mg (1/120 gr) every 1 hour or 1 mg (1/60 gr) every 2 hours until there is relief from pain or until nausea or diarrhea appear then stop the drug The usual total dose to achieve this is 4 8 mg (1/16 1/8 gr) and the pain and swelling will subside *in 24 72 hours* *Once* the patient knows the dose that produces toxic symptoms the drug should be given in a single dose of about 1 mg (1/60 gr) less than this Then continue colchicine 0 5 mg (1/120 gr) b i d q i d until attack has completely subsided If diarrhea becomes too severe treat as for any acute diarrhea (see page 258)

2 Corticotropin (ACTH) and cortisone may provide dramatic *symptomatic* relief in acute episodes of gout but since colchicine seems to be about equally effective and provides a more lasting effect the latter still appears to be the drug of choice It has been observed that when ACTH and corti sone are discontinued shortly after termination of attacks many patients will promptly relapse unless colchicine is given

B General Meas res.

1 Drugs

a Analgesics At times the pain of an acute attack may be so severe that relief of pain is necessary before colchicine becomes effective In these cases codeine, with or with out aspirin, may be gi en Morphine should be avoided for fear of addiction in this chronic disease

b Cin hoph n or neocinchophen should not be used

2 Rest *Bed rest seems very important in the management of* the acute attack Bed rest should be continued for about 24 hours after the acute attack has completely subsid d E rly ambulation may precipitate a re urr n e

3 Physical therapy is of little val e during the acute attack although hot or cold compresses to the affected joints may make some patients more comfortable

Int rim Treatment.

A Specifi M a res. Therapy aimed at prevention of acute at tacks has been generally quite dis ouraging

B G ne al Me ures

1 Diet

a Low purine Most low purine diets (low weekly allowance of meat and avoidance of kidney live aw etbreads sardin s anchovies meat extractives) tend to become nutritionally inadequate and often fail to influence the hyperuric mia or *course of the di ease How v r* in gouty arthritis the *restriction of high pu ine foods appears* to be of great import nce in prevention of progression of the disease

b Al ohol Al ohol h s often been blamed as a precipitant of a t attacks Howev r there is little vid nce that lcohol in mod ration will do this or is at all harmful in this condition

2 Col hicine The d ily us of c lchicine is controversial and the drug i rar ly effe tive in pr v nting atta ks If it fails to r duc inciden of att cks it should be reserv d for acute att ks

T atm nt of Complic tions

A Chron Gouty A th ti In re nt ye the outlook for pati nts w th this d a e ha g atly improv d In many cases the p og ess of the disease is arre ted and in some act l re b sorption of gouty deposits may oc ur This condition is best tr ated by a low pu ine diet and the newe uricosuric drugs

1 U i osu ic drugs

a. Probene id (B nemid®) an age t whi h blocks the tubular reabsorption of filte d u at h been mployed in dos s of 0 5 Gm b i d to q i d for long periods and h s be n r ported to p ovide relief in h onic gouty arthritis Acute pisode of gout m y oc asionally be pre ipit ted by this treatment but it is claimed th t th tta k dimin ishes ft r continued tr tm nt Full dos s of ol hicin may be us d with Benemid®

b S li ylat s Large doses of s licylat s (p to 5 Gm.) daily have be eported t produ e a uricos ri ffect similar to the above with reli f of symptom Do not u concurrently with Benemid®

c Ph ylbut zone (But olidin®) H bee report d t p o id eli f in acut and ch oni gout c ompani d by l w ing of serum uri a id Th drug i admini ter d or lly as em ric coat d tabl ts 100 mg 1 3 tablets daily according to d Toxi ity includes na sea ti vation of peptic ul vertigo ra h and derm

2 S g ry may off r som help in relieving m hani l d formiti s but is not alw ys eff ctive

B R nal C mpli tion The form tion of l uli m y be red ed if p ti t ar n ou g d to d i k t le t 3000 cc of fl id daily Once al uli have form d little can be done to diss lve the stone although f ing fl ids and lkali i ing the u ine with 8 16 Gm (2 4 d) of sod um lact t or sodium citr t per day may be helpful, t le t in pre ting further tones f om forming

PHYSICAL MANAGEMENT OF ARTHRITIC JOINTS (PHYSICAL THERAPY)

Gener l I rincipl

Ce in gene l prin iples whi h pply t the tr atment of diseased joint des rve mphasis

1 A range or upport the fr ct d j ng in comfortable posi tions which will provide for g t m l th c use in he event hat joint motion be subs quently los

2 In the ankylosing f rms of arthri is aft the acut process

has subsided employ careful active exercises or passive mobiliza tion early and regularly as toler ted in order to prevent deformity and to preserve joint motion

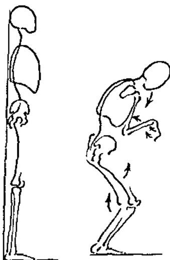
3 Avoid measures which cause a persistent increase in symp toms So called routine measures e g heat are not uniformly tolerated by patients The correct balance of heat massage rest and exercise must be planned for each patient

4 Patients with joint disease (particularly rh umatoid or sup purative arthritis) are in onstant threat of deformity Guard particularly against flexion deformities

5 The services of a specialist in physical therapy should be utilized whenever possible

6 If the arthritis is severe th course of the disease seems unfavorable or ankylosis appears inevitabl early consultation with a specialist is imperative Special orthopedic measures such as manipulation under anesthesia traction special casts bra es and corsets and surgi al measures including arthroplasty capsu lotomy tenotomy arthrodesis and synovectomy may be required

7 Emphasize to the patient the importance of compl te co operation and his responsibility with the physical therapy program at home as well as in the offi e or hospital Stress the importance of year round continuance of treatment if necessary Instruct the patient and/or his family and friends as to the exa t a d proper use of heat immobilization and passive mobilizatio under hom conditions



Normal Posture and the Deforming Tendencies of Joint Disease

OPTIMAL FUNCTIONAL POSITION OF JOINTS

Should ankylosis s em in vitable d spite d quat therapy o desirabl early rthoped c consultation i imperativ Th follow ing tabl gives certain ommonly accepted optim l function l posi tion in which j ints may be p rmitted to fus It must be empha iz d however that a given position is functi nal fo a given indi idual d pe ding upo su h facto s as living habit occupation r reation and pe sonal prefe nc s

J int	Position
Should r	A m abdu t d at about 75 th lbow joint placed in line with the ant rior ch t and with partial p onation of th fo arm
Elbow	Elbow at lightly le s than 90° with th fo earm in a position mid way between supinat on and p onation Ex ptions laborers f ll supin ti cleri l workers f ll p on tion
W i t	Slight (30°) d fl ion
Hand	P tial fle ion of finge and m ta arpoph lang al j ints and p ti l pposition of thumb
Hip	Unilat al in ol m t Ext sion with mi im l bduc tion and minimal lateral rot tion Bilat l involvem nt Slight fle ion of on hip joint and th oth abo
Kn	A ti e indi iduals F ll xt ns on Sed ta y ind vid uals 35 of fl xion Young individuals with acti e epiphys e Only light fl ion
Ankl	Foot t 90° angl with l g minimally eve t d

REST IMMOBILIZATION AND SUPPORT

Spi

Re t in a comfortable position on a fl t fi m bed without pillow at head is s tial A 3 5 ft plywood or other impl type of bedboard pla d under a thin, firm hair or felt matt i ad is ble Immobiliz tion and support of the spin by imple well applied dhesive trapping m y give prompt tempo y li f Suit ble re t or ba k braces m y be mployed on ambulatory patie t with mild ymptom Special body molds (plaste sh ll) or rigid ja kets may be advis d by the orthopedist for patient confin d to bed

C vi l Spine

Re t in comfort ble position on a flat fi m bed wi hout a pillow (above) Immobili tion and support of he d may be ac compli hed by spe ial orthopedi or hom made collar The latt may be made imply by f lding soft b th tow l twice lengthwi e and wrapping ugly ound neck and fastening with pins Tra tion may be nece a y if deformity i pre e t or pain is seve

Should r,

Rest in bed in a comfortable position on a flat firm bed without a pillow (as above) Support the arms with pillows in a position of intermediate abduction and external rotation After patient is ambu latory the arm of the involved shoulder may be supported by a sling

Elbow,

Support the arm and hand (thumb and fingers free) in a molded bivalve plaster cast with the elbow in a position of maximum toler ated extension This is to combat the natural flexion tendency

Wrist

Provide rest and support for the hand in a bivalve splint which corrects the natural deforming tendency to wrist flexion and ulnar deviation At first the splint should be worn continuously except for removal 1 or 2 times daily to permit physical therapy later the splint need be worn only in bed

Hand,

A supporting plaster splint fitted into the palm and extending to form a pocket for the partially flexed fingers may prevent the natural deforming tendency of hyperextension of the metacarpo phalangeal and distal interphalangeal joints and flexion of the proxi mal interphalangeal joints This splint should be removed 2 to 3 times daily to permit physical therapy

Hip

The patient should be at bed rest A detachable plaster hip spica may be used to provide support and rest for the acutely in volved hip joint It may be worn all night but it must be removed at least 2 or 3 times daily to permit physical therapy (at least in the case of rheumatoid joints) The patient is instructed to lie prone in bed with 1 or 2 pillows (as necessary) under the abdomen to fix pel vis for 1/2 to 1 hour 1 or 2 times daily (The weight of the body is utilized as a load against the powerful flexor muscles of the thighs) The pillows may be removed as tolerated and as the flexion de formity is corrected

Kne s

The patient should initially be at bed rest Weight bearing upon the acute joint should be restricted or prohibited In mild and non deformed joints the posterior plaster splint is convenient to use and will suffice It should be worn almost continuously while the patient is in bed particula ly during the night Adjustable splints with slight flexion may be employed on patients who are able to walk When joint involvement is more marked and flexion deformity is present correction plaster casts are appli d in a position of maxi mum correction and left on for 3 days The cast is bivalved and removed for physical therapy twice a day New casts are made to provide further correction as indicated During convalescent or chronic phase provide support for the knee with elastic bandage posterior splint or special orthopedic braces

Ankles and Fe t

Weight bearing upon the acutely involved joints must be

prohibited P ovide a cr dle or large pillow at the foot of the bed in o der to hold th bed loth s off the feet A pporting rem vable plaster boot c t (with tip of toes expo d) is l able Adjustable or s rial biv lved plaster foot casts m y be empl yed fo the grad al r e tion f def rmities Pr vide well built shoes llowing proper le gth and width for toes stability and a suitable r h sup p rt (sponge rubber or felt pads a e quit s tisfa to y) Co re t abn m lities and def rmiti s of the hip a d knee joints which p o d c mechani al t in on the f et

HEAT

Loc l H t

A Ge ral Principl s

1 Pla the p t of the body t be t eat d in a mfortable a d elax d position

2 Begin t atm t slowly a d c tiou ly

a Treat f r short p riods not longe than 15 to 20 minutes initially When the kin i pink a d moist ough heat has been given

b Sta t with low r temper t res adjust d t pati t i dividual toleran e

3 Grad lly incre tim and t mperature f ctors as toler ated and a indicat d

4 Avoid drafts in the tr atm nt room

5 F llowing treatments provid p otecti e ove i g for 20 to 30 minutes to avoid chilling

B I di ations

1 Ac t and con ale ent diseas of joints muscl s fas i e t dons and bu e to r lie pain nd to r d ce mus l spasm.

2 Abdomin l ramp (non u gi l abdomin l d)

3 Ch onic in olvement of j int muscl s fa cia t ndons and bur s, to reli ve pain, reduce muscle paam hast re overy p oc ss and to serve as an adjun t or p pa ation fo othe physi al th apy methods

C Cont indi tion

1 The (w p t nt in whom local heat d init ly and pe sist ently aggr vat s symptom (I the e s a tri l of cold therapy m y be w rranted)

2 Loc l dis ases of the skin

3 I e ipheral vascular di ease (vasc l insufficiency) (see page 207)

4 Diabetic p ti nt (use cautiou ly)

5 P ti nt with loss of skin s nsation

6 When large areas are to be tre t d

D Method

1 Conductive heat He t tran f rred to the body by d rect continuity with he t ource Thi i th le st penetrating form of he t

a Hot wa r bottl or bag or lect i he ti g pad Simple re dil, available he t source There is som dange of cutaneous burns

b Hot compress s Simple r adily a ilab and ff ti e

both home and hospital use The water should be maintained between 98° to 105 F (36 5 and 40 5 C) the bath should be for 10 to 45 minutes as tolerated

2 Wet packs An effective technic for hospitals but not gener ally satisfactory for home use Cold wet sheets are care fully applied to the skin and the patient is wrapped in blankets *The patient is allowed to remain in this pack for ½ 1 hour* This method should never be employed by untrained personnel
3 Steam baths Not advisable for home use since home made steam baths may be dangerous
4 Body baker A larger version of the *ordinary* baker de scribed on page 329 may be employed on patients who are in the recumbent position For patients who are able to sit up cabinets with numerous radiant electric lamps or resistance coils may be used
5 Sun baths (heliotherapy) Graded daily exposure (as toler ated) to the sun s rays is beneficial for its combined heating ultraviolet and tonic effects

COLD

In rare cases patients are unable to tolerate local heat and will *do well with local applications of cold*

A Cold compresses or ice packs applied locally to the joint for 10 to 15 minutes 2 4 times daily as needed
B Ethyl Chloride Spray Particularly indicated in fibrositis or osteoarthritis It is applied like local anesthesia to the 'trig ger point as a substitute for procaine infiltration or heat Ethyl chloride spray should be followed by stretching and exercise

MOBILIZATION OF JOINTS AND SURROUNDING SOFT TISSUES

After the acute process has subsided institute exercise as early as tolerated in order to prevent deformity muscle atrophy and altered joint motion (see page 324) No other physical therapy methods will prevent these abnormalities or serve as a substitute for exercise

Proceed cautiously with graded exercises Avoid sudd n tran sitions Reduce the intensity or change the nature of the exercise if there is persistence of or increase in symptoms (spasm and pain)

Passive Exercise

A Simple Passive Motion of Joint Through the Existing Range
This is done by a physical therapist or other pe son or by the patient himself The movement is slow it should cov r the *complete available range of the joint* and be repeated seve al times No force should be used and the patient should be re laxed *The objective of passi motion is to prevent loss of* range of motion particularly in patients who are immobilized by splints slings sand bags etc
B Stretching Similar to passive motion and is som what forcef l

it is c i d slightly b yond the e isting ange This p oced re m y caus a ce tain am unt of pain and should be p e ded by analg sic (s e p g 36) Stret hing sho ld be pe formed only by a physical th rapi t or physician The i dications f r t tch ing are as follows

1. In d f rming types of arthritis it is us d t d c ea e fl xion contr ctur
2. In o t rthriti and f brositi it m y act lly le d t a cu by giving omplet pain li f
3. In p ture c r ction stret hing i an adjunct to active xercis

C. Manip lation A pa sive rath r f ful a d s dden mobili a ion f j int in dir tion whi h is ot used physi logi ally e g sid w d motion or ot tion in a m t arpopha ang l j int Manipul tion should be don only by a phy i ia pr f bly without anesthesia Manip lation is used t bre k u pai f i i t rticul adhesion It may al be u ed in te d f t t hi g It ha th dvant g that th mob l zation cannot be ountera ted by voluntary ont tion o spasm be au of the di tion of th p il

M s g

E ntially mobili tion of oft tis ue by dir t m l or digit l action M ssag i f mino lue in h m toid arth itis It is f more val in fibrositis but an e dily be r pla d by t et hi g and e l Cont indi ations fo mas ge are local skin di phl biti and ad an ed rt iosclerosis Se l typ have b desc ibed

A. Stroking (ffleu age) ha ntially p y hologi l and anal ge i eff t
B. Kn d ng (petri s g) prod di t m ual st t h of mu l and s bcutan ous ti ue It i and t d in fib ositis whe th masse m y f l a d rub out p inf l f brositic nod l s
C. F i tion m g con isting f small c lar movem n s of th fing rtips will e ve th me p rpos
D. P us i nd ibr ting mo m t are ot f medi l al

E t t of The p

A. Numbe of Trea me s St t hing and m i nce of r nge of motion may be p es ibed as fr que tly a very 2 ho M s s g is usually not given more than on e a day manip l tion not m than on o twice a we k The minim m of the py de pend on the pati t s ond tion A ingl t t hing or mani p lation m y cu a fibrositis In deforming joint d eas th mobiliz tion should be f que t nough t f ll ob tive of m int ining or increasi g ge of motion
B. Duration of T m P s ive motion and t etching should be pe t d seve l times for e ch j int I or y one j int is involved the proc du will last only 2 to 3 minut s I seve al joint re t t d it will l st longe but how d not eed 15 minut s If all joints anont be t at d in one s s ion the number of tr time ts hould be incre d and the join a t r nated

rapidly as possible

G Stall Bars (ladd r exercises) For girdles and extremity joints
H Treadl Exerci s For ankles and knees
I Pedaling Exercises (bicycle ex rcises) For hips and knees
J I r St ps For lower e tremity joints
K Special qu driceps exercis s, which include static contrac tion straight leg raising active motion and graded r sistive exercises

Occ pational Therapy or Recreational Exercises

Pro ide an incenti for the patient to u e impaired parts These measures may be instituted by trained therapists in the hos pital or in the home and the instr cted patient may carry out the therapeutic program The desired objectives the precautions and the limitations of such methods must be explained carefully to the patient Lack of special facilities or equipment can be more than readily compensated for by some thought and ingenuity in utilizing materials at hand For example the forearms wrists and hands may be exercised effectively by typing piano playing string in strument playing business machine operation molding or clay modeling wood and machine shop work weaving wood carving needlework and painting

Chapter 13

DISEASES OF THE NERVOUS SYSTEM

DISORDERS OF CONSCIOUSNESS

Dist banc s of th s orium may be associ ted with decres d motor activity (g stupor or com) or in as d motor acti ity (e g x item t d liri m mania) S nsori l dist rban s may g from partial cloudi g t compl te oblite ation of cons ious ne The p it of re ction of thes di rders depends upon th tur d i t n ity f th timulu nd the phys al m tal and motional status f th individu l Som of the s tive f cto s e t sum ce b ovasc lar cid t d g int xi ations poisoning f ver met boli dis de m ningiti overwhelmi g infe t on onvulsive d sord rs and rdiac decompens tion

STUPOR (code No 933) and COMA (code No 932)

St por s g f om partial t lmost ompl te los of on ciou nes Com i compl t on iou ss f om which the pati nt annot be a ou d by th most p inf l tim li

D gnos

A. H o y I t rogat patie t during l id intervals Valuable f rm t on may l be obtained from the p ti t f t nds relatives and attend nts Inquire pe ifically about the pa ti t oc pation p evious phy i al, m t l or motion l illne and bout t um al ohol, drugs epil psy o hypert n ion

B. Physi l F mi a ion Place p rticula mphasis on vital signs id e of in ry or intoxic t on nd ne ologi al abnorm l iti s Do not um se cel l dist banc s a due t al ohol me ly be a an al oholic br th is detect d

C. Labor ory Proced.

1. Ca h the patient if neces ary and amine ine sp cia ly f r albumin blood g nd cetone
2. P rf m routin Hgb WBC d.ff e tial ount nd hem o- It det rmin t on
3. Dr w blood for N P N glu os and CO_2 ombining pow whe indi ted (f r diagnosis of di betic coma and uremia)
4. Lumba puncture should be conside d for all omatos pat ent un s there are pecifi ont indi ions (g u pe d post rior fossa ions)
5. Spe ial stud es may be ind cated, g b ood cu ure a d

analysis of body fluids for evidence of toxins
6 Skull x rays when indicated

Treatment

A Emerg ncy Measures *The objective is to maintain li e until specific diagnosis is made and treatment administered*

1 Maintain adequate respiration First determine the cause of any respiratory difficulty (e g obstruction pulmonary dis ease depression of respiratory center vascular collapse)
   a *Keep airways open* Obstruction must be removed or prevented
      (1) Place patient on his side or abdomen with face to the side always with the head well extended *Never on his back or with head flexed* If necessary pull tongue forward with fingers or forceps and maintain in an extended position (e g by pharyngeal airways)
      (2) Aspirate mucus blood and saliva from the mouth and nose by means of a lubricated soft rubber catheter Suction may be conveni ntly applied with a large (25 50 cc) syringe
      (3) Endotrachial catheterization may be necessary The services of a trained anesthesiologist or otolaryn gologist are desirable for this
   b Artificial respiration may be administered if respirations have ceased or are failing (see page 131)
   c Oxygen may be administered by mask catheter or tent as indicated (see page 139)
2 *Shock* Institute imm diate treatment if pat ent is in shock or may suffer shock (see page 31)

B General M ur s

1 Constant observation of the patient must be maintained
2 Place in shock position unless this is contraindicated by head injury (see page 3) Change body positions every 1/2 1 hour unless contraindicated to prevent hypostatic pneu monia and skin ulcerations
3 Catheterize patient if coma persists for longer than 8 to 12 hours and patient fails to void If necessary insert an indwelling catheter Use sterile technic
4 Nutrition and hydration Provide proper fluid and nutrition by I V glucose amino acids and saline solutions (see page 27) for the first few days until the patient is able to take fluids by mouth If the patient is comatose for more than 2 3 days *tube feedings must be employed (see page 57)*
5 Sedation
   a When ver possible avoid sedation or other medication until a specific diagnosis has been made
   b Sedation with paraldehyde or barbiturates may be neces sary for mild restlessness in those cas s not due to barbiturate or other drug toxi ity

C Spe ific M asures Direct measures at removal of specific causes such as fevers inf ctions toxins (see specific diseases)

DELIRIUM (code No 931) and MANIA (code No 037)

D lirium is char cte iz d by m t l dist rban e (g illu sions del sions and hall cin tions) phy ical e it m nt with st l s d la k of coh r nc

M nia is a form of insanity often t mpor y cha acte ized by wild o racti ity and at time by ill ion delu ions and hallu i n tory tr ds

Th se two conditions are discuss d t gether be ause th y sh many points in common The p incipal therape tic diff r nce lies in the ch i of s dative a d hyp otic medications Although most s d tive and hypnoti drugs in proper dos ge m y be us d with rela ti e impunity in mani the number of drug whi h an be employed in delirium i limited It is ad is bl to rest ict u h dr gs for delirium to pa ldehyde hloral hydrat and in certain a s opolamine or a coti Chlor l hydrat is contr ind at d in cut alcoh li deli ium

Di gn i

Se Com page 335

Tr tme t

A P ot t From Physi l I j r

1 Quart r L e f t room available p f rably on l we t floor of building
2 Windows S r n, ba or oth rwis prote t windows Lock d he y r e e m t d l able
3 Furnit re Rem ll furnitu and f rnishing f om the oom ept a low bed a bed with side boards or at tim simply mattr on th floor The room must be fre of sharp objects
4 Avoid mechani al strai t wh ver pos ibl e ept f r pe ifi medi al or s rgi al e ons Use ch mical r i t ts such as pa ldehyde or h l hydr t o u e hyd otherapy as m tioned later *Ob erve fo uicidal or destructi e t dencies*

B R r Pati t

1 B im ki dly and unde tanding R cognix pati nt s action s thos of confus d and i k per on Do not u thr ts
2 Lighting and nois See that the room is adequat ly light d both day and night and free from shadow l n l noi es ho ld be voided but famil a ounds m actually s rve t r a ur the pati nt Remember that the p t t may be w d a d will mi i t p t t nge s n ry tim i
3 Help th pat t to under t nd what is happe i g and why he i in h s pa il ua it tion D not mi pres t Ex plain d gnos and the ap utic proc d res when n e ry
4 Relatives and frien l R cru t aid of p tient s r la i we f i ca si e as f mi iar f gur s they m y rve t l n the pa i t s apprehension How r t y hist i p tients f equent y be con d turbed unde the ircumstan s
5 Cons nt nurs g t ndance i necess ary

C S tive d Hypnot Drugs

1 P de de s d by most ici ia as t e drug of

choice in delirium Barbiturates bromides and opiates often serve to increase the excitement of delirium but may be used in maniacal states (see below) Paraldehyde has an added advantage in that the ordinary stock paraldehyde solution n eds no sterilization and for that reason is available for immediate administration by any desired route The oral route is preferred unless the patient is unable to swallow For details of administration see page 38

2 Chloral hydrate may be given instead of paraldehyde in doses of 2 to 8 cc (½ 2 dr) of the 25% stock solution or *as capsules 0 5 2 0 Gm (7½ 30 gr) orally* Chloral hydrate is contraindicated in acute alcoholic delirium or psychosis
3 Barbiturates *Not to be used for delirium*
   Caution Observe carefully for respiratory depression and see that adequate airway is maintained
   a Thiopental Sodium U S P Thiopentone Sodium B P *(Pentothal Sodium®) First inject 2 3 cc of a freshly* prepared 5% solution slowly I V observe then give additional dosage as needed for desired effect
   b Amobarbital Sodium (Amytal Sodium®) N F 0 125 0 5 *Gm (2 7½ gr) as freshly prepared 10% solution slowly* I V to point of desired effect
4 Morphine sulfate 8 15 mg (⅛ ¼ gr) with scopolamine hydrobromide 0 3 0 4 mg (1/210 1/160 gr) may be administered subcut when delirium is marked o is associated with or caused by pain
5 Scopolamine hydrobromide For delirium *without pain Scopolamine 0 3 0 4 mg (1/210 1/160 gr) b i d q i d* may be valuable

D Hydroth rapy
1 A warm t b bath (92° 97° F) or so called neutral bath for half hour periods t i d or q i d may be tried on suitable patients this may be of considerable value This method should be tried prior to intensive drug therapy whenever possible *If it is tolerated well and results are effective* the patient may remain in the tub for hours Hydrotherapy is not applicable for certain unmanageable patients for patients with infectious or febrile diseases or for patients with surgical dressings
2 Wet pack This effective technic should be administered only by trained personnel The patient requires constant supervision The method is contraindicated in patients who are physically weak or exhaust d are having convulsions or who have significant cardiovascular disease Vital signs must be observed at least at 15 20 minute intervals

E *Nutrition and Hydration Unless there is a specific indication* for hypohydration a no mal state of hydration should be maintained This is specially true in the presence of fever For delirium tremens of alcoholism 1 2 liters (1 2 qt) of 5 10% glucose solution containing 100 mg (1½ gr) of Thiamine Hydrochloride U S P Aneurine Hydrochloride B P and 100 mg nicotinic acid should be given daily Proper nutrition should be maintained Small frequent feedings are best tolerated

F P y hi t i C If o din y m sure s m ntion d above do not ffi onsid r transfer to psychiat ic hospital E i uat f aibility of eff ting the t ansfer d if d cided upon provide for adequate atte da ts

HEAD INJURIES

Proper manageme t of the p tie t w th a head i jury r t in gre t meas e upon ne rological and s rgi l diagnostic and tre t ment methods

Di gn i

C f l initi l amin tion and close ob e v tion of the p tie t in th immedia t po t t a m ti p riod are es ntial

A Signs and Sympt m

1 Alt t on in the stat of consciousnes in the imm diat period aft r th head inj ry
   A l cid int rval f llow d by m may indicate e r br l mp e ion by e bd l or pid l hemorrhage If p o gr ively de peni g ma oc aft r a period of cons i u ne s followi g a h d i jury e pi rat y t phin tion i indicat d t rul out bdur l or pid l h m h g

2 *Prog ssi foc l ign may indi t du al hemor h ge*
   a Ipsil t r l pupil is usually dilated
   b Cont l t ral h mipa may oc ur ipsil t l h mi p ia may l o oc u arely

3 If the p tie t mains uncons iou d gnosi of p og ive intra ra i l hem rrhagic lesion is d f i u t
   a Vit l signs (pul rate re pi tione blood p s) m y h ge although the re not liabl gns
   b I ca f de pe i g or un lly p olong d c ma e pi r tory tr phi tion l indi t d
   c P olonged ncon iousn is beli f t indi e se e e dam g t the b n stem

B Labor t ry Find ng

1 Lumb pun tu is adv sab e to e tabli h the p of bar hnoid h morrhage and t give b line appe ran e and p es r of the brospinal fluid

2 X ll ys should b made in those c in whi h t pati nt ondition pe mit
   a Pr sit nd nat re of f act r s m y be de cr ed
   b Pre of pineal h ft an be certained

3 El t oen phalog aphy m y iat in diagnosi nd p ogno i of s l ct d patie ts in the c r nic pha

Trea m

A Em g nc M r

1 T t a if pr e t par nt r y a mini ed f is and/or blood m y be requ red (ee pag 22)

2 Attent on t the re pi atory t a t i import t main nan of adequa pu mon y ventil t on i vit l
   P t hould be p d in p ne pos t on w h he d turned to one s de t facili t d in g of s t e from mouth and t keep the tongue f om ob tru t g the pha yn

b Intratracheal intubation or *tracheotomy may be necessary* to maintain open airway
c Give oxygen if necessary (see page 145)

B C n ral M asur s
1 Quieting patient During acute or initial phases restless ness may be a disturbing factor
a Special nursing care and paraldehyde may be required
b Avoid morphine because of medullary depressant effects
c Catheterization of a full bladder may ameliorate restless ness
d Lumbar puncture with removal of small amount of bloody cerebrospinal fluid may also relieve agitated patient
2 Antibiotic treatment is always instituted in the presence of *bleeding or discharge from nose or ears* *Give penicillin* procaine 300 000 units b i d until danger of infection is over

SYNCOPE (Fainting) (code No 0xx)

Syncope is a transient loss of consciousness due usually to temporary cerebral anox mia The exact mechanism of syncope is not clearly understood

REFLEX SYNCOPE

VASODEPRESSOR SYNCOPE
(Vasovagal Syncope Simple Fainting Benign Faint)

This is usually characterized by a sudden fall in blood pressure and a slowing of the heart The causative stimuli m y be sensory (e g sudden pain) or entirely emotional (e g death of a loved one) The patient is usually upright when the faint occurs recum bency rapidly restores onsciousness

Treatment
Patient should be placed in the recumbe t position and head lowered Simple inhalation of fumes of Aromatic Spirits of Ammonia U S P B P may be tried if ne essary

ORTHOSTATIC HYPOTENSION
(Postural Hypotension) (code No 460 x10)

This is a rare cause of syncope and oc u s as the pati nt assumes an up ight position *It is asso iated with a marked drop* in blood presau e on arising

T eatm nt,
Treatment is directed towards th underly ng a se whe pos sible If abdominal ptosis is p esent an abdomin *l belt may* pre vent splanchnic pooling of blood Elastic tockings may b of v l e

V soconstrictor drugs may be t ied but are usually without benef t

CAROTID SINUS SYNCOPE (code No 408 584.x)

There i usually a hi tory of fainting associated with spells of dizziness betw e atta ks A d finit relation to sudde turning o raising of head or wearing of a tight collar may be elicited Th diagnosis is s gg sted by reproducing tt k by firm pr ssur and massage o er the c rotid sinus for 10 to 20 seco ds *Stimulate only one carotid sinus at a time Caution must be exercised in stimulating the sinuses in elderly patients Cerebrovascular accidents have been precipitated by this maneuver* Thre types of carotid sinus yn ope ar k own to occur

V g l Typ
This is the most ommon type and i most freq t i old pe sons Ca otid si p e sure slows the h art rate This response an be bolished by the inj ction of Atropin S lfat U S P B P 1 mg (1/60 gr) I V

Va omotor Type
Oc u more frequently in younger individuals Carotid sinus p su causes a fall i blood pressur this an be abolished by inj ction of 0 5 c (8 ℥) of 1 1000 Epineph in U S P Ad line B P b t is unaffected by at opin sulfate

C b l Type
C otid inus pressure affects n ith heart rate no blood pressur and neith r pinephrin n atropin s lf t aff ts the r fl A direct ce bral ff ct is postul ted

T tm t,
Correct all abn rmalities wh never pos ible Eliminate motional problems and forbid us of tight collars In sev e cases denervation of the inus s may be nec ssary Loc l ane th sia of the carotid sinu s abolishes all type of c tid inus syncope

A V g l Type At opine sulfate 0 4 0 6 mg (1/160 1/100 gr) 3 t 4 tim daily (more if ne ded) will u ually aboli h at t cks Ephed ine ulf te or hydrochlorid 0 25 Gm (3/8 gr) with phenob bit l 0 015 Gm (1/4 gr) 3 to 4 tim daily may be helpf l

B Va omotor Type Eph drine and ph oba bit l as above will u ually p ve t attacks

C C b l Type Drug are of no value

SYNCOPE DUE TO CARDIOVASCULAR DISORDERS

This type of syncope is due to bral anoxia whi h res lts f om a t mporary fall in ca diac output Som of the uses are Stok Ad ms syndrome onset of p roxysmal t h c dia myo- rdi l infarction and p lmonary mboli m Thi m y be as o- i t d wi h c rt in other types of he rt di a e (g a rtic st no si and tetralogy of F lot)

Treatm nt.

Treat the underlying abnormality

SYNCOPE DUE TO METABOLIC DISTURBANCES

Hypoglycemia may cause syncope or coma If prolonged or re current treatment is required (see page 409)

Hyperventilation if severe and prolonged produces respira tory alkalosis with resulting tetany and syncope

Treatment

Consciousness can be restored by rebreathing into a paper bag holding breath or administration of carbon dioxide 5 10% with oxygen by mask If attacks are recurrent psychotherapy must be considered

HYSTERICAL SYNCOPE

Hysterical fainting may either be true or simulated syncope The physician must be watchful of the associated objective findings The patient rarely if ever has an attack without the benefit of an audience

Treatm nt

Psychiatric evaluation and p ychotherapy

VERTIGO AND DIZZINESS

The term vertigo is generally used to denote the subjective sen sation of rotatory movement either of the individual or his environ ment Dizziness implies an inability to orient the body in relation to surrounding objects However the terms are generally em ployed as synonyms

TRUE VERTIGO

This is found primarily in disease processe involving the laby rinths the vestibular portion of the 8th cranial nerve and their nuclei or connections True vertigo is usually manifested by nys tagmus falling to one side and abnormal reaction to tests of vestib ular function Among th more common caus s are

1 Meniere s syndrome (see page 357)
2 Acute labyri thitis (see page 357)
3 Organic brain damage involving the vestibular nerve its end organs or connections or the cereb llum
4 Drugs and toxins (e g streptomycin se page 507)

Treatm nt.

Tr at the underlying disorder

DIZZINESS

Di ziness is a subj ti e complaint There may be no obj ctive findings it may however b associat d with infectious processes and other toxic condition It also occu s in c s s of c eb ovascu lar dis with impair d cir ulation and i a commo symptom in hypertension Howeve it is prob bly most often found in patie ts with emotional disord rs

Treatment,

Restor optim l general h alth If functional el me ts p d m inate and the symptom is s vere psy hoth rapy may be of val e

HEADACHE
(code No 961)

Headach m y be d e to many factors and must always be cog nized as a symptom The underlying ause m st be determined and treat d in order to effecti ely relieve the symptom Th s bj cti e sensation of he dache indi ates inv lvement of th pain ensitive structur s within and about the kull H daches may b lassified as follows with s me of th m re common ca s s listed

A M ning i (and Alll d Str t l) Invol m t This is d e to sp occ pying l sions m ning iti in d intracranial p e sure and d c eased intracrani l p es ure (following lumba punct e)

B Va l l l m t

1 Int anial va odilat tion D t fev r rt in drugs and toxins (g alcoh l and histamine) s p is or emotional f tors

2 Extrac anial vasodilat tion (particularly of the ext rnal carotid) Migr ine is th princip l mpl

3 DI e of th blood ves els (g temporal arteritis)

C M c losk let l l volvem nt

1 M cl p m of arying degre s Due to myositis adj cent arthritis o oet itis

2 M cle te ion due to emotional factor

3 Bone or joint involvem t of kull, head, or cervic l verte b e Due to rthriti o t itis oste myelitis or tumo

D N ve l l m nt Neuralgi (g t ig min l n lgia)

E Mi ll ou Ext r l l In lvem nt Due to di s and d orde of th yes ears nos pharynx, teeth, t

F Emotional l volvem t He dache due to motion l dis rders are ily associat d with muscle t nsion (ee above), but this is not alw ys th cas At times th head he may be due to int ranial vasodilatation.

Di gnosi

The diagnosi must be ba d on a comp t history and phy ical examinat on Special ttention to the ey e r and nose is im portant A complet blood count urinalysi and blood test for yphilis must be perform d In m y see an adequ te psy hiat i amination i al o indi at d Sk ll x ys and el t o- n phal g ams are us ful

The pain of meningeal involvement is deep and is usually the most severe Pain of vascular origin is usually throbbing in char acter pain of neuralgia has a burning quality Headaches of psycho *genic origin are superficial* and are *manifested* by dull tightness or pressure

General Nonspecific Treatment Measures
- A Physical and mental rest
- B Sedatives should be used only as a temporary measure and should not be used as a substitute for a complete work up and specific therapy *Narcotics are generally contraindicated* ex cept in terminal disease
- C Analgesics constitute specific therapy in febrile headaches due to their antipyretic activity They should not be administered for prolonged periods indiscriminately their routine use often *obscures important pathology*

HEADACHES DUE TO MENINGEAL INVOLVEMENT

Thes are the most severe but they usually respond to anal gesics Manifestations depend upon type and site of underlying *pathology*

Tr atm nt
- A Specific Measures Treat the causative lesion
- B Ge e al Mea ures
  1. *Analg sics sh uld be given as needed if pain is not too* severe (s e page 36)
  2. Narcotics may be necessary if pain is very severe (see page 37)
  3. Lumbar puncture performed very ca tiously may sometimes be used to relieve *headache associated with increased intra* cranial pressure (e g subarachnoid hemorrhage hyper tension nephritis not in posterior fossa tumors)
- C Lumbar Punct re H adaches These are b lie ed to be due to le kage of the cereb ospinal fluid from the puncture site
  1. *Ana gesics If headache is mild upon arising analgesics* such as aspirin 0 3 Gm (5 gr) ev ry 2 3 hours may be suf icient
  2. Recumbent position If lumbar punctur headache is very severe it can be alleviated by lying down
  3. Intrathecal injection of small quantities of sterile normal saline may afford relief in severe cases

HEADACHES DUE TO VASCULAR INVOLVEMENT

These headaches are usually throbbing in character Intra *crani l vasodilatation usually causes bilateral pain but migraine* an extracranial type is usually unilateral Compression of the common carotid may relieve both types of heads hes *migraine* may also be relieved by compression of the external ca otid artery

Tr atm t

A I t cr ni l Va odil t tion These are us ally readily relieved by s mple an lg cs s h as aspirin 0 3 0 6 Gm (5 10 gr) ev ry 2 t 3 ho s

B Mig i e (od N 930 x40) Ext a anial vasod latation (be l ed to be in lv me t of extern l a otid or its b anch s)

1 Tr atme t of a te att ck

a E gotamine Tart ate U S P B P

(1) Ergotamine tartrat I M th g nt and route of choice 0 25 0 50 mg (1/240 1/120 gr) will reli e h ad che within an hou in mo t es Administer drug as e ly in attack as possibl Do not r peat dose more oft n than once w ekly

(2) E got mine tart at by mouth 4 to 5 mg (1/15 1/12 g) s blingually o orally ontinue with 2 mg (1/30 g) very hour until he dach h dis ppeared or until total of 11 mg (1/6 gr) has be n administ ed This method of admi istr tion is not gen lly d i d be s f the possibility f o d sage If th pat t mits as e ult of hi d s ase it is impo ibl to k ow how mu h of th drug h ha ab o bed Ergot mine i also le s eff ctual by these out

(3) Toxic ff cts A few pati nts omplain of numbn s and tingling of ext emiti s and s m mu cl pains and tension *Do not administer ergotamine t pa tien f ept c n infectious states or who have peripheral vascul r disease or who scler tic heart disease or who are pregnant*

b Dihyd oe got min (D H E 45®) (not a c pt d) in dos of 1 0 mg (1/60 gr) I M m y be b tituted f r ergota min tartr t Thi drug may h ve f w r side re tion than rgotamin t rtrate

P u on xt nal a otid one of it br n he ly in the att k will ofte aboli h p in

d 100% oxyg n by n al mask m y r li v the ut atta k

2 Ge al m re

a Until drug begins t eli ve h d h ha p ti t t in hal

b Aft h d h h be n eli d pati nt shou d r t in bed fo t least tw hours a q i t da k d oom with out food d ink Thi will p omot elax tion nd is imm d t ly ry t prev nt another tta k f om oc ing

Aborting an att k Many pati t m y bo t thei att k by the f lowing m an

a Att mpt to g in ma im m laxation by w m bath

b R t in bed in d ken d room for a ver l hou

Drugs

(1) Pentob bit l odium 0 1 Gm (1 1/2 gr) by mouth

(2) E gotamin ta t t 3 4 mg (1/20 1/15 g) sublingu lly

(3) Aspi i 0 6 Gm (10 gr) w th or w thout odeine 0 06 Gm (1 g) by mouth may be us l in mild att k

Preve tion of further att k M gr ne i a p ychosom ti as R duction in at k m y be a ompli hed by

psychotherapy There is little evidence that special diets glandular therapy etc are *effective except as psychothera p utic devices*

C <u>Dis se of Blood V ssels</u> Since many of these conditions are associated with vasospastic phenomena vasodilators are indi cated Nicotinic acid 100 mg (1½ gr) t i d to q i d orally *has been found to be of limited value*

HEADACHES DUE TO MUSCULOSKELETAL INVOLVEMENT

Muscle contraction or spasm may be caused by disease of the muscle or adjacent structures or may be associated with excessi e fatigue or emotional tension The muscles attached to the occiput are most frequently invol ed and give the characteristic occipital headache There may also be a feeling of pressure or tightness or a band like constriction of the head associated with emotional ten sion The psychogenic headache usually appears after periods of emotional stress

<u>Tr atme t.</u>

A Muscle spasm due to organic disease and bone or joint pain may be relieved by appropriate physical therapeutic measures (see page 323) Analgesics are usually also of value (see pag 36) Specific therapy should be dire ted at the underlying disease

B <u>Muscl Te ion Head ches.</u>
1. Rest relaxation and freedom from emotional stress are of primary importance (see Psychotherapy on pag 41)
2. Heat to the involved muscles by means of hot towels heat ing pad or a warm bath will help relieve the discomfort
3. Gentle massage of the muscles will usually also be of benefit
4. Drugs may be of value in acute cases but prolonged use should be avoided
   a. Phenobarbital phenobarbitone 15 30 mg (¼ ½ gr) q i d will temporarily relieve many headaches d e to *nervous tension*
   b. Aspirin 0 3 0 6 Gm (5 10 gr) every 3 to 4 hours may also be of benefit

HEADACHES DUE TO NERVE INVOLVEMENT

Treat specific cause (see page 356)

HEADACHES DUE TO MISCELLANEOUS EXTRACRANIAL CAUSES

Treat specific underlying dise a Analgesics may be of value but should not be substituted for specific therapy

THE DEGENERATIVE DISEASES

MULTIPLE SCLEROSIS (code No 906 953)

A disease of unknown tl logy ha cteri ed by patchy demyel inization in the central nervous system which may be due to or a so ciated with diffus ve ular thr mb sis It is manif st d by diff s neurologic l disturbances r trobulb r neuritis nystagmus slurred p ech int ntion t mor and spa tic pa aly is C S F xamina tion sh w nothing char t isti Th di ase is slowly progres sive with spo taneous temporary remissions

T tment
Chi fly symptom tic

A R t Ad quat sl p at night and r st in the aft noon has be n found to mak p tients more comfo tabl

B T mp stu e Changes A ld sudden chang s in t mperature (t rnal int nal) to reduce vas ula pastic ph om non (lthough vid e that spasm play a role in the disease is questioned by s me) H t m k s these p ti nts much wo cold oft n improves th m temporarily

C Reh bilit tion physic l th py and psychoth py to attempt t mak th p t t y to live w th h disab lity and yet make th most of what er assets he till retains

PARALYSIS AGITANS (Parkinsonism) (code No 946 4 953)

A ynd ome ch ract ized by rhythmical "pill rolling t emo of resti g muscl s with associat d sp sticity and rigidity a stooped postur ma k like f i and a p opulsi e gait In l t r life it is usually a sociated with arterioscl rotic chang s in the basal ganglia in younger lif it is usually s e with post c phalitic chang in the b s l gangli

T tm t
T tm nt i mainly ymptom tic Litti ea be don to arrest th p ogre ive post ncephalitic or arterios lerotic chang s that occur

A Spe ific M re A n mber of drug ha bee found to be ffe tive in allevi ting the symptom of p rkinsonism Thes drugs ar us ally used i combination to obt in the optim l therapeutic sault

C tion In p tients with p r lysi agitans never stop one drug ab uptly when instituting the apy with a new one Alw ys introduc the new drug i lowly incr asing quantiti s while g d ually reducing the old

1 Artane T ihe yph nidyl® Effective f r sustain d ontrol of rigidity minor tremor and akinesia Dos g 1 or 2 mg (1/60-1/30 gr) to 5 mg (1/12 gr) t i d For oc logyric tais us 10 mg (1/6 gr) t i d Principal ide rea tions s me for tropine bat c rdiovas u ar eff ct min.mal Use with caution in glaucoma

2 Bell donna alkaloids

ANTISPASMODIC DRUGS

Drug	Effect On			
	Tremor	Rigidity and Spasms	Akinesia (w akn ss)	Oculogyric C isis
Arta e®		X	X	X
Atropine and Belladonna Alkaloid		X		
B nadryl®	X			
Cogentin® (MK 02)	X	X		
Dexedrine®			X	
Hyosci e	X			X
Pagitane®		X	X	X
Panparn l®		X		
Parail ol® (Lysovane®)	X	X		
Rabellon®		X	Y	
Stramonium	X			

(Modified from L J Doshay Clinical Appraisal of Parkinson Treatment The Merck Report April 1954 Reproduced with permission)

a *Atropine Solution of U S P B P* (½%) Effective for spasms and rigidity Start with 3 drop doses at intervals of about 6 hours increase dosage *by 1 drop every 3 days* until a dosage of 10 drops t i d is r ach d Limited to younger patients because of danger of glaucoma in eld rly Early toxic symptoms are blurring of vision dryn ss of mouth vertigo and tachycardia Excessive dosage may produce vomiting dizziness mental confusion and *hallucinations*

b Belladonna Tincture U S P B P Has same effect as atropine Start with 15 drops t i d and increase gradually *to 30 drops t i d* Chief side effects are sam as for atropine Do not give to patients with glaucoma

3 D ph nhydramine Hydro hloride U S P (Benadryl®) Anti histaminic for control of tremor Dosage 50 mg (3/4 gr) b i d to q i d

4 Cogentin® (MK 02) Most effective agent against rigidity and spasms also against tremor Excellent when combined with Artane® as well as Pagitane® or Dexedrin ® Chi f side reac tion dryne s of mouth Dosage Begin with 0 5 mg one or two times daily and increase as needed (up to 5 mg daily)

5 Dexedrine® 5 mg (1/12 gr) morning or noon or Benzedrine® 10 mg (1/6 gr) to counteract fatigue somnolence lethargy

6 Hyoscine Hydrobromid U S P B P Useful in control of tremors Dosage ranges fro n 0 3 mg (1/200 gr) b i d to q i d in elderly patients to 0 6 mg (1/100 gr) b i d to t i d in the young Distressing s de effects may include somnolence dry mouth, blurred vision and drowsiness

7 Pagitane® Action similar to Artan ® but less drying effect Useful when effect from Artane® w ars off Dosage 1 25

mg to 5 mg t i d to q i d Contr indi ated in glau oma

8. Caramiphen Hydrochl rid (Panparn t®) Us ful in young pat e ts as m scle r l xant D sag f r ad lt 50 100 mg q i d
9. Par id 1® (Lysovan ®) Tablet ontain 50 mg (3/4 gr) M y be g v n q i d in dosage ranging from 1/2 to 1 tablet
10. Rab ilon® (hyoscine hydrob omide at opine ulf te and opolamine hyd ob mid) Ha r lativ ly little ffect on tremor Tabl ts contain 0 5 mg (1/120 gr) of mixed bella donn lk lo ds Gi n in 1/4 1/2 o full tabl t dos g b i d t q i d dep ding on ag and tol ran e of patient Sid reactions d yness of mouth and blu r d vision Contra ind at d in gl om
11. Tincture f St monium, B P Especially g od fo co trol f t mor te ion nd e it m nt Dos ge st ts with 15 drops t i d and increas s slowly to about 60 drop t i d

B C 1 M s re

1. Physi l th r py Should includ m ssag stretching of muscle and a tive exerci e when po sible P ti nt sho ld be ta ght to exer ise daily th mus l s most rely affected e pecially tho e of h nds fi g rs w ists elbows knees and neck
2. Re uranc of control of symptoms and psych logi l p port will be g at fully l ed by p tient
3. Avoid barbitur t s Pe mit mod rate d s of alc hol some tim s t i t sion

P gnosis

Th d s a i slowly progressive b t it is not f tal

CEREBRAL VASCULAR ACCIDENTS

Cer b l vas ula accide t du ither to thrombosis hemorrhag o emboli m The diffe e tial di gnosis i important in order to tre t th underlying a se (see table below)

Diff rential Diagnos s of Ce br l Vascul r A idents

	H mor hage (94 yx5)	Thrombo i (94 618)	Embo i m (94x 618)
Ag	45 65 yr	Ov 45 yr	A g
U ual und r l ing ca	Hyp rt sion	Art oscle os	C di dise
On t	S dde	Sudd or r p dly progr i	Sudden
H d t	Int	Slight or b t	V b
M i i t ius	De p oma	No mal t de p om	N m l t d ep oma
T y is	Comp t hemipl g	S g t p to hemipl gi	S g t p to hemipl gia
Sp nal f d p s e	Hi gh	Normal o ight l vat d	Va iab
Blood in p n l f id	C ly p t	Usually b t	Ab nt o slight

Treatment

A Acute Phase or Onset

1 Complete bed rest

2 Nursing care Handle patient carefully to avo d injury to patient and paralyzed extremities

3 Sedation If patient is agitated sedatives are necessary However patients with thrombosis should not be depressed too much with sedatives

a Oral paraldehyde 4 cc (1 dr) in milk, fruit juice or whisky repeated as necessary

b Rectal paraldehyde 8 15 cc (2 4 dr) in 30 cc of oil

c I M paraldehyde 4 8 cc (1 2 dr) deep into the buttocks

4 Feedings If patient is unconscious or unable to swallow do not attempt to give feedings by mouth Maintain nutrition with tube feedings or by parenteral means

5 Phlebotomy If hemorrhage has occurred and blood pres sure is elevated phlebotomy of 500 cc may be used to re duce chances of further bleeding

6 Lumbar puncture If hemorrhage has occurred perform lumbar puncture very cautiously removing just enough fluid *to relieve severe headache Do not perform Queckenstedt s test* in patients with suspected hemorrhage

7 *Voiding* Catheterization may be necessary if spontaneous voiding does not occur

8 Procaine block of the stellate ganglion and 100% oxyg n in halations have been recommended for cases due to throm *bosis This procedure may also be useful in cases of cere* bral embolism but it is contraindicated in cases of hemor rhage

B State of Re overy and Convalesc nce The rehabilitation of the patient with hemiplegia due to cerebral vascular accident should begin early and should be intensive Although it varies with different patients and the *details are important* the following phas s may be deline ted

a Bed phase

b Standing phase

c Stair climbing phase

d Cane walking phase

(For details of rehabilitation program see p 547)

Prognosis

If the patient survives the acute attack the prognosis for life is good With active rehabilitation most patients will be able to walk and care for themselves Return of useful function to the upper extremity is rare (*These patients can be trained to achieve a re markable degree of recovery if given adequate care and rehabili tation*) Prognosis for functional recovery is poor in those patients with severe organic mental syndrome or sensory aphasia

HEPATOLENTICULAR DEGENERATION (Wilson s Disease)

This extrapyramidal disease characterized by progr ssive intention tremor athetosis rigidity dysphagia contractures

muscle w akness dementia Kays r Fleischer ring emaciation, and associated li disease has be n reported to be d to a defect of coppe m tabolism

Tr tm t

Dim reaprol U S P B P (BAL®) h been reported to be effecti e in rem ving the excessive opper The clinically useful dos is 2 5 mg (1/24 gr)/Kg body weight by inj ction b i d for 10 12 day periods

THE CONVULSIVE DISORDERS

EPILEPSY (Idiopathic) (code No 934)

Epil psy is a symptom complex whi h may be charact ized by one o more of the f llowing manif st tions (Lennox)

1 Impairment of con iousness
2 Involuntary mo ements of muscles
3 Disturbance of the utonomic nervous syst m

Diagnosis

Th e are thre maj r clinical type The diff ntial diagnosis i very important because th ther py of each diff rs Individual may ha e mor than one type of seizu e Electro en ephalogr phic st dy is indic t d in all pileptic p ti t

A G and M l (od N 930 01) (Rule out other causes of convul si e sei ure) This type oc urs in all ag groups The us l fo m has ge liz d toni and clonic onvulsions which may begin foc lly and r main so or may spread without loss of con iou s (Ja ksonian) Th y m y occur in single it ks varying in occurr nce from hours to years

B P tit M l (ode N 930 07) The us al f rm is characte iz d by a t an i t l pe of ons iousness of 5 t 30 s onds and gen ally n convulsive s izure occu s D ing th attack there i commonly a rhythmical 3 per ond blinking of th ey s It occur most frequ ntly in children and is rare after ag 30

C P ychomot S i ur (Epil pti quivale t) (od N 930 0) Thi form i f equ t in dults and m y be h i iz d by periods of automatic behavior The p ti t s emotional content is usually e tirely altered f om ormal du ing the attack The attacks v ry in cha acter and thes pati nts are often dang rous to thems lves and soci ty

D Status Epil pti us (code No 930 x06) R pidly recur ing s t of g and mal type which haust pat t and m y be fat l

Trea m t

E ept in statu pilepticus no tre tment is given du ing an tta k pt to k ep patie t from being injur d (e g biting hi tongue)

A C and M l *Lever withdraw an anti onvulsant drug suddenly*

1 Diphe ylhydantoin Sodium, U S P Ph yt in Sodium B P (Dilanti ®) is the drug of choi Give 0 1 Gm (1½ gr) aft r

evening meal for 3 to 7 days increasing dosage by 0 1 Gm (1½ gr) daily every week until seizures are brought under control If attacks are se ere and frequent may begin with 0 3 Gm (4½ gr) daily on first visit Average dose 0 4 0 6 Gm (6 9 gr) per day After convulsive seizures are controlled *the Dilantin® may be reduced if desired* but should symptoms again appear the dosage should immedi ately be raised again

There are a few toxic reactions to Dilantin® but most troublesome is gum hypertrophy This is best controlled with careful mouth hygiene and gum massage When large doses are given ataxia or drowsiness may appear (see page 354)

2 Phenobarbital U S P Phenobarbitone B P If patient is on maximum dosage of Dilantin® and there i inadequ te re *sponse gi e phenobarbital in addition in same manner and* dosage as Dilantin® increasing dosage as with Dilantin® *while maintaining patient at full dosage of Dilantin®*

3 Methylphenylethylhydantoin (Mesantoin®) If excessive gum hypertrophy results from the use of Dilantin® m thylphenyl ethylhydantoin may be tried in its pla e The dosage is the same Mesantoin® may be ff cti e where g a d mal and petit mal coexist Do not suddenly change to Mesantoin® but gradually substitute for Dilantin® Combinations of both may prove more useful than th individual drugs Wh n using Mesantoin® special precaut on sho ld be ob rved for toxicity (see page 354)

In the eve t of failure of the above drugs bromides Phenurone® Mysoline® Mebaral® or Hibicon® sho ld be tried (see chart pag 355)

B P tit Mal

1 Very mild state If attacks are infrequent (less than 1 per day) give no treatment or treat only with small doses of phenobarbital

2 Mild state

a *Amphetamine sulfate* 5 10 mg (1/12 1/6 gr) 2 to 3 tim s daily may be attempted D not use amphetamine if pa tient also suffers with g and mal bec use this may pre cipitate grand mal attacks

b Glutamic acid 8 to 10 Gm (2 2½ dr) daily may d cr ase the number of atta ks

3 Moderat and severe states

a Trimethadion U S P (Tridio e®) is the drug of cho ce Trimethadione is v ry ffective in petit mal epilepsy but unfortunately is not an entirely saf d ug since it causes bone marrow depression *in some ndivid als Where er this drug is used perform CBC once or twice a week for the first month then every two weeks for two or three months and monthly thereafter* Dosage Begin with 0 3 Gm (5 gr) daily a d inc ea e the daily dose by 0 3 Gm (5 gr) every 7 d ys until at tacks are controlled Do not give more than 2 Gm (30 gr) daily

b If grand mal seizures o cur also trimethad one may

aggravate this t d n y the f re it may be n es ary to administer medication for g and mal sei s simul taneously and in som cas stop th trim thad one

c P ram thiadione (P adione®) has recently been developed It is said to b le s toxic than trimethad one and is equ lly ffecti in petit mal attacks It is almo t wh re other drugs fail The s me precautions as for t im thadion must be obs rv d (s e page 354)

Milontin® Phenuron ® phenobarbital P enderol® Mebaral® o a ket g ni diet may pro e useful where the above drugs fail

C P y homoto Epil p y P tients must be w tch d and guarded t pr ve t inju y to th mselves or oth s

1 Diphenylhydantoin Sodi m U S P Phenytoin Sodi m B P (Dilantin®) with without ph n ba bital phenob rbiton empl yed as f g and mal epilepsy i th tre tment f ch ice

2 Phenylac tylur Phen mid N N R (Ph one®) has p o d to be eff ti in c ntrol of p ychomotor epilep y The drug is administer d initially as 0 5 Gm (7½ gr) 3 tim s daily and incre e d until ymptoms a ont oll d p to 5 0 Gm (75 g) daily di id d into 3 to 5 qual doses Th drug is v y toxi nd p ecautions must be observed with its use (ee pag 354)

D St t Epil pti

1 P ald hyd 1 2 c (¼ ½ dr) in 3 tim the v lume of alin lution I V slowly If nvulsion doe n t stop peat dose imm di t ly

2 Amyt l Sodium® gi e 8 12 cc (2 3 d) I M (7½ 15 g) I V phenoba bital sodium 0 5 1 0 Gm

3 G ner l ane thesia may be give s s f il

4 Dilantin® As soon s edati m asu s a ff ctiv p s at ma h t be th ugh s v n while p tie t is still uncon ious d gi 0 1 Gm (1½ gr) Dilantin® d s olved in wat r y 3 h until s i ure a e unde control (maximum 10 doses)

E D tion f T tm nt M t pil pti s must r ive ther py for lif Howe if s iz es a nti ely cont lled f 3 5 ye s th ti onvul ant drug may be al wly (ove 1 2 yea s) withd awn t c rt in if eizu till occur

F Ge l M su

1 A quaint p ti t with his di a In s it bl cas thi m y be a omplish d in p rt by re ding book about the dis as (e pag 356)

2 A id ha rdous oc up tion and driving

3 Avoid inactivity It i important to maintain regular p o gram of physi l activity

4 Ke p patie t in optimum physi l ondition and avoid e ve f tigue

5 Forb d all al ohol

6 Tr t motion l f tor when thi is indi t d

7 Instruct patie t t baol te nec s ity for f ithful adher nc t drug r g m n

8 An id tifi at on ca d hould be arri d at all time

DRUGS USED IN EPILEPSY

D g	Ind tions	A g D ily Dos	T xi R tions	P i s in U e	R m k
D ph yihydant in Sodi m U S P (Dilanti ®) Ph ytoin Sod m B P	G and m l S m se of p y hom tor p l p y	0 3 0 5 Gm (5 7½ gr) in divid d dos s	F w ction 1 G m hype t ophy 2 N ous se t ia, ra h y t gm	1 M int i good d tal hygien 2 Redu d ge if to icity appe s	Saf t drug f man g ment of grand mal and p y homoto epil psy M y c e tu te petit m l
M thylph yl thyl hyd t in (M ant in®)	G and m l S m s of p y h m t p l p y Eff tive wh grand mal and petit m l oe i t	0 3 0 5 Gm (5 7½ gr) in di d d do	1 Ne ou taxi y t gmus 2 P yt pe ia 3 Exf liati d rm titis	1 R d d g 2 F que t blood ounts 3 Stop m dication if ere kin ruption d lop	Does not gum hype t phy
T imethad on U S P (T idion ®)	P tit mal	0 3 2 0 Gm (5 30 gr) in divid d d	1 P cyt pe i 2 Exf li ti d rm titi 3 Phot phobi 4 N ph o i	1 A f M ant in® bo 2 A f M antoi ® above 3 Usu lly dis ppear Wear dark gl sses 4 F que t u inalysis Di tin d g if l l ion develop	D not u lone f r g and mal Tridion ® may aggra at this condition
P m thadion N N R. (P di ®)	P tit m l	0 3 2 0 Gm (5 30 g) in divid d d		A for T idion ®	T xi r tions at t d to be le than with Tridion ® Other m rk for T idion ®
Ph m d N N R (Ph uro ®)	P y h m t pil p y	0 5 5 0 Gm (12 75 g) in di id d d se	1 H p titi 2 P ot in i (be nign) 3 D m titi 4 H d h 5 P son lity hang	1 Li r fun tion t t t on t F llow u inary urobili g t gul int ls 2 Stop drug How if p ti t is h ing m k d relit f m y ontinue 3 Stop dr g 4 Stop d g if 5 Stop d g if ve	

Drug	Ind ations	Ave ge D ily Dose	T i R ctions	P ution in U	R m ks
Phenobar L U S P Phenoba b one B P	All p ep ie spe ially as djunct	0 1 0 4 Gm (1½ 6 g) in di ided dos	1 D ow ine 2 Derm ti is	1 D dos 2 Stop drug and um l t If de m titis ur top drug irely	On of af i d g M y metimes ggr vat p y ho mot e l ur T xi ion
M hoba b al N N R (Mebar ®)	A phenob b t l	0 2 0 8 Gm (3 12 gr) in di id d dos	A phe oba b tal	A in noba b t l	3 m hyl d i ti of ph barbital Must be us d in twi dos ge ha dvant ge ph ob bital
Br des (Pot m or Sodium B omid U S P, B P)	All p ep ai pe ially as djuncts	3 6 G (45 90 gr) in divid d dos	1 P y hos 2 M t l dulln 3 A neform kin ash	Stop d g m y m l l dos ge	Ra ly d w Eff cti e at tim whe all is f ile
Phe loroprop mide (Hibicon®)	G and mal	1 4 Gm (15 60 gr) in divid d dos	1 Skin ash 2 M y stimul t om pa i	1 S p d g 2 De dos top drug	U f l in onjun tion w h th lconvul ant
5 5 die yl l methylba bituric id (Gemon i®)	G nd m l	0 1 0 8 Gm (1½ 12 gr) in divided dos	D w ne	De dos	E pe i lly ll i in i ociated with g ni b ain d mage and infantil myocloni pil p y
5 phenyl 5 yl he hychopy imid ine (M li ®)	G and m l	0 4 2 0 Gm (6 30 gr) in divid d dos s	1 D ow ine 2 At ia	1 D dos 2 D e dose r top d g	
N me yl phe yl suc inimid (Milontin®)	P t t m l	0 6 2 4 Gm	1 N us 2 Ata i 3 Di ine 4 H m t ri	1 R d dos g 2 or 3 di ontinu 4 Di onti ue	
2 2 d i yl l 3 propaned, l (P ndo ®)	Pet t m l	2 5 Gm. (30 75 gr) in di ided dose			A l l g and m l

Identification Card

THIS PATIENT HAS EPILEPSY
Name____________________
Address____________________ Phone________
Put a padded stick or spoon in his mouth to protect his tongue Keep him from injuring himself
Doctor s Name____________________
Address____________________ Phone________

G Education of the Epileptic Patient
1 Books for the epileptic patient
   a Lennox Science and Seizures Harper and Bros
   b Putnam On Convulsive Seizures a Manual for Patients J B Lippincott Co
2 Encourage the epileptic patient to becom a member of The American Epilepsy League Inc Room 405 50 State St Boston 9 Mass Patients may receive information regard ing research and treatment from this orga ization

DISEASES OF THE CRANIAL NERVES

TRIGEMINAL NEURALGIA (code No 964 x30)

Trigemin l neuralgia is chara terized by a sudd n attack of excruciating pain of short duration over any of the d st ibution of the 5th cranial nerve The attack is normally prec pit t d by stim ulation (usually mild) of a trigg r zone in the area of the pain

T atm nt
A Med al treatment is ge erally unsatisfactory but the follow ng usually are tried before resorting to surgery
   1 Trichloroethylene (15 20 drops per day by inh lation from handker hief in single or divid d doses)
   2 Short wave diathermy over the area of exit of the nerve 1 hour daily for 6 days
   3 Massive doses of vitamin B_{12} (1000 micr grams daily by inj cti n for 10 days) have been reported to relieve the se vere pain of trigeminal neuralgia
B Surgery must be resorted to if there is no relief from these

BELL S PALSY (*Peripheral Facial Paralysis*) (code No 965 y10)

A paralysis of all the muscles of one side of the face usually precipitated by exposure chill or trauma

Tr tm nt
Assure the patient that recovery u ually occurs gen rally in

8 weeks it m y take up to 1 2 years in older p tients

A P ot ction of Face
1 K p f c warm and avoid further exposur
2 Prot ct ye with a p tch if n cessary
3 A o d wind a d dust

B Physic l Th rapy
1 Supp rt f by us of tape or wire fr m angl f mouth looped about the ar
2 Electri al stimulat on m y be used to h lp pre ent atrophy of muscles U e e ery 2 days after the 14th day
3 Gentle mass g in an upward dir ction for 5 10 minut 2 3 tim s daily of th involved muscl s may help th tonus
4 H at from inf a red lamp may h sten r covery

MENIERE S SYNDROME (code No x00)

Menier s syndrom is a ymptom complex of unknown etiology which invol s th labyrinthine portion f the 8th n r It is m ni fested by sudden r curr t atta ks f tig n us a vomiting ystagm and tinnitus and by progr s i d afn ss

Tr atm t
A Sp ifi M Non a ailable
B C l M
1 R assu n e is import t as many of thes p ti nts ha e m rk d p ychic overlay
2 Salt f e di t a d ammonium chlo id 1 2 Gm (15 30 g) q i d may be h lpf l
3 Ni otini acid (niacin) (not ni oti mid) 50 100 mg (3 4 to 1½ gr) I V b i d to t i d r 100 mg (1½ gr) lly 5 to 6 time daily has been found u ful
4 Th nt hi tam nes e pe i lly di h nhydr m ne hydrochlo ride (Benadryl®) a d dim hydrinate (Dram mine®) in d s of 50 100 mg (3/4 1½ g) 3 t 4 t mes da ly appe to be of be fit to som p t

DISORDERS OF EQUILIBRIUM

ACUTE LABYRINTHITIS (code No x85 910)

Ac t labyr nthiti i t di mma m f th n whi h s ally f llow pi at y f or nd ma f t d by t ten vertigo lly w h m k d tin tu targ g t and ny t gm

T tm
A Spe M h n it ble
B Gene l M
1 Bed at p f r bl i da k d oom u til ymptom subsid
2 Drugs
a. Antibioti a of li tl alue unl s the i associated

infection of middle ear or mastoid
- b Antihistamine drugs may be of some value (as for motion sickness see below)
- c Sedation is generally helpful Phenobarbital phenobarbitone 15 60 mg (1/4 1 gr) t i d to q i d

MOTION SICKNESS (code No 010 576)

Motion sickness is an acute illness characterized by anorexia nausea dizziness and vomiting *Many factors play a role in its* production the principal ones being visual kinesthetic a d psycho *logical Physiologically* the vestibular apparatus appears to be involved

Prophylactic Treatment Is *of M st Importance*

- A The antihistaminics appear to be of b nefit Dimenhydrinate (Dramamine®) or diphenhydramine hydrochloride (Benadryl®) given in doses of 50 100 mg (3/4 1 1/2 gr) q i d is stated to be very effective
- B *Parachloramine (Bonamine®) is a long acting effective agent* Usual dose 50 mg (3/4 gr) every 6 12 ho rs
- C Parasympathetic depressants alone or in combination with mild sedatives Scopolamine hydrobromide or atropine sulfate 0 2 0 4 mg (1/300 1/150 g) every 3 to 6 hours
- D *Mild Sedation Phenobarbital pheoobarbitone 15 30 mg* (1/4 1/2 gr) every 3 to 6 hours may help pr vent att cks

PERIPHERAL NEURITIS (code No 98 y10)

Peripheral neuritis can be caused by a large number of factors both local and general There may be either sensory involvement (with pain paresthesias and other subjective sensory disturbances) or motor involvement (weakness and paralysis) but more frequently both

- A Toxi Forms, E g lead arsenic mercury or diphtheria toxins
- B *Infections,* Guillain Barre type of multiple neuritis
- C Deficiency Type Especially of the B complex (beriberi) is often a sociated with *superimposed toxic neuritis such as the alco* holic polyneuritides diabetic neuropathy
- D Traumatic, Due to direct injury to the nerve

T eatme t,

Treatment in each depends upon the etiological factors

- A Specific Tre tment
  1. Remove noxious agent e g alcohol lead source
  2. Vitamin B complex Attempt to obtain optimal metabolism of nerve tissue by liberal use of vitamins especially B complex *Thiamine hydrochloride aneurine hydrochloride* 15 mg (1/4 gr) t i d to b i d orally or parenterally and *dried yeast (brewer s yeast) 10 30 Gm (1/3 1 oz) daily f r* entire B complex (see B vitamins pag s 61 and 62)
- B Gene al Tr atm nt

1 Bed r st Plac patient in bed if possible and avoid use of aff ct d limb If low r extr mity i affected ke p cr di o r foot of bed to pr ve t pre sur of bed covers
2 Analge i s s necessary to control pain (se page 36)
3 Physi al therapy (see page 330)
   After pain h s sub id d physical therapy (m ss ge and pa sive motion) may be of valu En ourag active mo tion at same tim
   b Prevent cont cture by m an of splints and p ssi e stretching

HERNIATION OF INTERVERTEBRAL DISK (code No 2511 9x9)

Compression and injury to nerve root may be us d by h rni ation of an int r rtebral disk Most commonly th lumbosacral int ertebral di ks (L5 S1 or L4 L5) are affe ted in th se es the symptom omplex of low ba k pain impaired ang of motion of lowe b k p ravertebr l lumb r muscle sp sm and p in radiating along the sciatic distribution re ommonly e ountered Onset of clinical omplaints is frequently rel t d to pisod in olving low back st in back inj ies or f lls The initial pisod may be followed by an int rval of ymptom tic impro ement

Exagg ation of ymptomatic c mplaints follows f equently upon laughing traini g ne ing

Tenderness in sciatic not h along cou se of th sciatic nerve impaired str ight leg raising diminished ankle jerk impaired n s tion ove di tribution of L5 of S1 may be demonst at d

Cha cteristic roentgenological def ct in the s bar chn id pace i u ually prod d by a herniat d inte rt b al disk and i e dily d mon trable by myelogr phy

T tm t

A Ge r l M re

1 In cute pha e bed st heat appli d locally to back an l ge ic s d use of a bed board unde mattr s s e indicated
2 T action to the lower ext mitl is frequently ben fl i l
3 The avoidan e of s vere physical effort and str in is e nti l to minimiz r cu en of symptom after the initial pi ode
4 Use of low back belt brace or supports may be benefi ial It is imp rtant to in truct pati t as to proper method of be ding lifting (with knees fl ed), and rrying (with obj t held cl to body)

B S gi al M a Whe e r sponse to conse vative me ure i poor when r curren s ha disabl d the patie t su gi l the apy is indicated. G tifying relief of the majo complaints of most patients i e pain usually follows the succe f l emoval of the offending h rniated disk R covery of oth r neu al functions (impaired motor power mu le atrophy skin s nsory changes) may be expect d lat r

MYOPATHIES

MYOTONIA
(Congenital code No 270 044) (Acquired code No 270 x20)

Myotonia is a disorder characterized by difficulty in relaxation *of skeletal muscles* following contraction which is initiated either by voluntary effort or by mechanical or electrical stimulation It is important to differentiate this disease from myasthenia (see below) because treatment with neostigmine or potassium aggravates *myotonia*

Treatment.
Quinine sulfate 0 3 0 6 Gm (5 9 gr) 2 4 times daily may give dramatic relief from symptoms

PROGRESSIVE MUSCULAR DYSTROPHY (code No 270 9x9)

A disorder characterized by *progressive wasting and weakness of muscles with* associated pseudohypertrophy (fat infiltration) of *certain muscle groups* It is important to differentiate this from myasthenia gravis because th latter can be benefited by treatment

Treatm nt
None of value It has been suggested that in bility to m tabolize vitamin E may play a role in the disea e but parenteral or oral administration of this substance has been of no benefit

MYASTHENIA GRAVIS (code No 270 562)

Myasthenia gravis is a disord r ch ra teri ed by weakness and marked fatigability of voluntary muscles R covery from weakness or fatigue occurs with rest or specific m d ations The disease *progresses by natural or spontaneous remissions and relapses* A therapeutic test of 1 5 mg (1/45 g) neostigmine methylsulfate with 0 6 mg (1/100 gr) atropine sulfat (diagnostic ampule) subcut *may be u ed This cau s relief of symptoms*

T eatment
A Emerge icy Tr atment *Patients may suddenly develop inability* to swallow or respiratory crises Patient should always carry 2 ampules of 0 5 mg (1/120 gr) of N ostigmine Methylsulfate U S P B P This should be given *immediately subcut or* I M if s vere symptoms develop The patient should be placed und r medical care at once and if additional neostigmine is needed 1 mg (1/60 gr) may be given parenterally 3 times in on hour until adequate response is obtained

In spite of administration of increasingly larg amounts of neostigmin prog essive weakness of muscles of respi ation may occur which may be fatal in some cases

1 When such an event can be anticipated tracheotomy set oxyg n equipment s ction apparatus and respirator should be available

2 F llowing t a heotomy patient is placed in r spi ator Oxygen i dministe ed as need d N ostigmine i withheld t opin 0 6 mg (1/100 g) administ ed to keep al way d y and suct on f a rway employed
3 Fl id and el ctr lyte balan e is maint ined du ing tif ial respi ation period
4 Ant biotics a e gi en to prev t pn umonia
5 Afte a f w days it s u ually poss bl to gr du lly de e se th t m sp nt in the r spir t s tolerated
6 In patie ts who s vi e c is r m ssion may oc ur in me inat nc s lasting f r s al y ars

B Sp cific M s es

1 N ost gm n B omid U S P B P 15 mg (1/4 gr) o al tablets D va i f om 4 to 12 t blets daily B gin with 1 tablet ev y 4 ho s (4 times a day) and inc eas dos g as equi d to gi e r lief
2 Eph d in sulf t 12 mg (1/5 gr) with e ch d se of n ostig min often enhance the a tion of n ostigmin
3 Pot ssi m has al o been found of lue to s pplement n o t gmine It m t h w v be giv n in 1 s t tox c dos 4 to 6 Gm (60 90 gr) p t ssium chlor d 6 t mes a day This is contraindicated if c d ac r al di e e i p sent
4 Alth ugh s m favorable result h e b en eport d with the us of c rti otrop n (ACTH) o o tiso e th y r so vari able that th o tine u of th e d ugs annot be cons dered
5 Some p tient ha be n mad wo s tempo arily T nsilon[a] may r li ve myasthe i weakn ss 10 mg I V gi s ell f in 20 to 30 e ond 25 t 50 mg I M gi s imp m t lasti g f hou

C C al T tm t

1 A quaint p ti nt with hi dise se using imple l y terms
2 M int in good nutrition nd health

D S g y Thym ct my is laim d to ben fit ome patie ts

P ophyl i

Ide t f tion ard n stigmin and s yring are to be ar ied at ll tim s gi ing th d agnosis nd m thod of treatm t

THIS PATIENT HAS MYASTHENIA GRAVIS
Name_______________________________
Addr_______________________________ Phone_______
If ob rved t be behaving trang ly o if he is found un onscious ll for physi ian or ambul nce
Phys ian N me_______________________________
Phy i ian s Add ss_______________________ Phone_______
Two am l of eostigmine and s yringe nd needl re in his pos ion Th must be administ red hypod rm lly in hi uppe arm immed at ly

Management During Pregnancy

Immediately after delivery children of patients with myasthenia may have severe signs of the disease Immediate treatment with neostigmine is necessary to preserve life After a few days the symptoms may disappear and the child thereafter does not suffer from myasthenia

FAMILIAL PERIODIC PARALYSIS (code No 270 x95)

A disease of unknown etiology characterized by recurrent attacks of flaccid paralysis of the muscles of the trunk and extrem ities and by a lowering of the serum potassium level during the attack Immediate relief of symptoms by administration of potas sium chloride is usually diagnostic

Tr atm nt

A I otassium chloride 5 10 Gm (75 150 gr) orally when di g nosis has been made and then 5 Gm (75 gr) b i d q i d dur ing acute episode as needed to prevent weakn ss or paralysis

B In emergencies only may give 1 Gm (15 gr) potassium chlo ride in 50 60 cc (2 oz) distilled water injected very slowly I V *This is a dangerous procedure* (see page 25)

Prophylaxis

Potassium chloride 5 Gm (75 gr) at bedtime is advised by some to prevent attacks

Chapter 14

METABOLIC AND ENDOCRINE DISEASES

DISEASES OF THE PITUITARY

In the diagno is a d tre tment of e docrine disorders it must be membe d that there is a very close interrelationship of the arious endocrine organs Not only do hormones ex rt a profound eff t on all tissu s of the body but the *endocrine glands* lso exert strong influences pon one anoth r For this *reason* the manifestations of endocrin dis ase may be either primary to a gi en endocrine gland or s condary l due to involvem nt of target glands Fo example the patie t with *hypopituitarism* may present with a pictu of frank myxedema and unless it is appreciated that the primary distu bance is in the pituita y administrat on of thyroid s bstance witho t simultaneo s use of corti oide s r s lt i erious addison n crisis

PANHYPOPITUITARISM (code No 841 777)
HYPOPITUITARY CACHEXIA (Simmonds Disease)
(code No 841 7773)

Orga ic hypopituitarism is due to d truction of the anterior pituitary whi h may be ca sed by tumors of the gland o post partum hemo rhage (Sheehan s syndrome)

Th term perhypopituitarism is possibly a misnomer since the significant variation in symptomatology from case to case may be due t varying d fi ienci s of the s veral *anterior* pituitary hormones Hypopituitary cachexia is also a misleading term since th se pati nts may be of normal weight or m y actually be obes Symptoms of organic hypopituitarism usually include w ight los weakness sensitivity to cold loss of ppetite and in t males am no rhea Physical examinati n re als l thargy loss of axillary and pubic hair and atrophy of skin and genitalia Laboratory findings are as follows low B M R low radioiodine uptak or PBI incre sed insulin sensitivity low urinary 17 k toste oid ex re ion and low urinary gonadotropin excretion These manifest ta ions are due la gely to lack of pituitary stimulation of ce ta get endocrine glands (thyroid gonads and adrenal

Differentiation of panhypopituitarism from anorexia nervosa (functional hypopituitarism) may be difficult Psychic disturbances may be found in both conditions although a history of specific emotional stress or long standing psychiatric symptoms is more suggestive of anorexia nervosa The nervosa patient is usually more alert and active and more able to withstand stress The axil lary hair is usually not lost in anorexia nervosa but is almost al ways lost in organic hypopituitarism The low urinary gonadotropin level (less than 3 mouse units per 24 hrs) of hypopituitarism may be of aid in diagnosis but is not definitive Improvement following special feeding technics and failure to respond to specific endocrine treatment would further suggest anorexia nervosa

Treatment.

There is no effective pituitary replacement preparation therapy must therefore be aimed at correcting the end organ defi ciencies This must be continued throughout life Almost complete replacement therapy can be carried out with cortisone

A Cortisone or Hydrocortisone 7 5 to 25 mg (1/8 3/8 gr) per day is usually adequat This should be given in divided doses 3-4 times daily

B Thyroid Thyroid (and insulin) should rarely if ever be used in panhypopituitarism unless the patient is receiving cortisone *Because of lack of adrenal cortical function patients* are ex ceedingly sensitive to these drugs For this reason one should exercise special care in differentiating myxedema from hypo pituitarism often a difficult problem

Begin with small doses of 15 to 30 mg (1/4 1/2 gr) daily and gradually increase to tolerance 60 to 100 mg (1 1 1/2 gr) is usually adequate

C Sex Hormones

1 Testoste one May be us d in both males and femal s primarily for its tissue building (protein anabolic) effect Dosage Testosterone Propionate U S P B P 25 mg (3/8 gr) daily 3 times weekly I M or Methylt stosterone U S P B P 10 to 20 mg (1/6 1/3 gr) orally in males In females the dose of th se drugs is half that for males If virilizing signs appear in the female the drug should be stopped and these signs will disappear Virili ing signs usually do not result if the dose is kept under 400 mg per month

2 Estrogens These agents are useful in the female for their mild anabolic effect their effect on secondary sex charac teristics and their possible neutralizing effect on androge Diethylstilbestrol U S P Stilboestrol B P 0 3 to 0 6 mg (1/210 1/100 gr) or Ethinyl Estradiol N N R 0 02 0 05 mg daily orally

Note Sex hormones especially estrogens should b employ cautiously in young panhypopituitary patients or the epiphyses will close before maximum growth is achieved

GIGANTISM (code No 841 7761)

Pit itary giganti m which is caused by adenoma or cancer of the pituitary is principally a result of hypers etion of the growth factor Growth which occu s primarily at the epiphyses of long bones is symmetrical and ge ralized and patie ts may attain a stature of seven feet or higher G owth is possible only if th over secretion of hormone occurs prior to the onset of piphyse l clos r Local pressure symptoms of the pituitary tumor may cause head aches dizziness and visual dist bances An elevated serum in organic phosph us is one of the b st di gnosti signs of activity Glycosuria may be pre ent

Tr atment

T tm nt is aimed at suppressing the p tuitary growth hormone

A E docrine Th rapy If gigantism is fou d in adolescence and ther is little or no e croachm nt of the tumor upon adjacent structur s (i e optic n rves) give Test t rone Propionate U S P B P 25 50 mg (3/8 3/4 gr) I M daily and gi e estrogens Ethinyl Estradi l N N R 0 1 0 5 mg by mouth daily Males should re eive la ger dos s of testost rone and fem les la ger dos s of estrogen This th rapy will prevent furthe growth by causi g losure of the epiphyse a d m y in hibit pituitary growth ho mon sec etion *Do not use methyl t stosterone*

B S gery and X ray Therapy If there is m rked encroa hment pon vi ual fi ld x ray therapy appear to be of valu If x ray th rapy does not control tumor growth su gery m st be considered

ACROMEGALY (code No 841 7762)

Hype secretion of the growth facto of the anterio pituitary d e to ad noma o carcinoma of the g.a d which de elops after th bony piphyses ha e fus d re ults in a clinical picture of p g ressive growth f soft tissues and thick ning of bon Th di eas usually has its ons t d ing th 2 d o 3rd decades It is haracter ized by conspi ious enla gement of the jaw nose s pra rbital ridges hand nd f et nd thi kening of the skin and visceral en la gement Elevation of th ino ganic s rum phosph rus is an im porta t d.agnostic point If the serum pho ph rus is norm l the dis s is probably inacti e and requires no f rthe tre tme t

Treatm t

A f gigantism (see above) Favo abl res lts have be n report d in som as s with ndocrine therapy

DIABETES INSIPIDUS (*Due to Unknown Cause code No 842 779*)

Destruction of the posterior pituitary or impaired function of the supraoptic nuclei or of tracts from these nuclei to the posterior pituitary (63% of cases *being due to tumor*) *causes the condition* known as diabetes insipidus This is manifested by severe thirst and marked polyuria A polyuria of over 6 liters per day with specific gravity below 1 006 is highly suggestive of diabetes in sipidus The diagnosis is established by the Hickey Hare test This test consists of (1) I V *infusion of hypertonic salt solution* which in patients with diabetes insipidus causes an increased urine flow and (2) administration of a test dose (0 2 0 3 cc) Vasopressin Injection U S P B P (Pitressin®) which causes a decrease in urine flow

Treatment

A <u>Spe f Therapy</u> Vasopressin Tannate N N R (Pitressin Tannate®) 1 cc in oil I M is the treatment of choice It is effective for from 24 to 72 hours It is usually best to admin ist r the drug in the evening so that maximal res lts can be ob tained during sleep Patients learn to administer the drug themselves and the dosage is adjusted as necessary Posterior pituitary snuff inhaled 2 3 times a day may be used but it is quite irritating and absorption is uncertain Th dos varies from 30 60 mg (1/2 1 gr) The aqueous preparation (Vaso pressin Inj ction U S P Pitressin®) is rarely sed in chronic treatment beca se of its short duration of action (1 4 hours)

B <u>Non spe ific M asures</u> Mild cases (or Pitressin® resistant cas s) require no treatment other than ad qu te fluid intake

C <u>X ray therapy</u> may be used in treatment of some cases of t mor (e g eosinophilic granuloma)

THYROID

The thyroid gland utilizes inorganic iodine to form a complex physiologically active thyroxin protein compound that is necessary for normal function of the organism The normally functioning gland removes the very low concentrations of inorganic iodine pres ent in blood synthesizes it through diiodotyrosine to thyroxin and possibly triiodothyronine and liberates the active materials prob ably a combination of the 2 or 3 organic compounds above or deriv atives thereof bound to protein *When an excess of ino ganic iodine* is p esent in the blood the thyroid cells pick it up and sto e it in organic fo m in the colloid of the follicle Under the infl ence of the anterior pituitary this colloid material can be released with its active principle into the blood stream The circulating organic *iodine is quite constant in health ranging from 4 8 micograms per cc of blood*

The req irements for iodin are ve y slight and difficult to estimate About 20 200 (0 02 0 2 mg) microgr ms per day ar

probably necessary At times of stress espe ially in puberty and during pregnancy and lactation the requireme ts rise as high as 200 1000 micrograms (0 2 1 0 mg) daily

Abnormal Metabolism

Although the iodine requirements are very slight in many areas of the United States and els wh re the e requir m nts cannot be met from local food and water sou ces

A Simple Iodine Lack (Simple Goite) End mic goit r or colloid goit r is cha t ri d by nla g me t of th thyroid gland and is due to relative or ab lute iodi e deficiency Th re is oft n a history of living in an iodine-d fi i nt ge graphic ar a (n demic goiter reas) Symptoms appea o ly if the enla gement i sufficient to c use pressure o surroundi g stru t res (esophagus trach a o recu re t laryng al erve) Ther is no evid nce of either hyper or hypofunction and accordingly the B M R serum prot in bound iodine cholest rol a d radioiodine (I^{131}) uptake re usually normal

B Hypothy oidism In this condition th gland fails to m ufac tur ad quate hormone This may ha e variou caus s (1) more compl t iodine lack than in simple goiter (2) inflamma tory de truction of the gland (thyroiditis) (3) xcessive su gi cal removal (4) failure of the pituitary to elaborat thyrot o pin In hypothyroidism the B M R radioiodine (I^{131}) upt ke and blood organic iodin are frequently low (the latt r is below 4 micrograms p r cent)

C Hyperth roidi m This disease is hara t ri d by n exc s sive s retion of thyroid hormone The causes of thi s e obscure but it i believed that in many cases the prim ry difficulty may be e cessive sec etio of ant io pituitary thyrotropic hormon This exc ssive ecretion c uses a speeding up of m tabolic fun tions speci lly the oxidati mechani m of c lls Th re is a resulting increa e of B M R the blood levels of o ganic iodine are frequently abov 8 microgram per cent nd the I^{131} pt k s are high

DISEASES OF THE THYROID

NON TOXIC DIFFUSE GOITER (code No 810 943)
(Simple Goiter)

Diagnosi

T re is oft n a history of living in an nd mic area Symptoms appe r only if the enlargement is so great as to cause press re on rrounding struct res (esophagus tra he or recurrent larynge al nerve) Th B M R and the serum protein bound iodine and radioiodine (I^{131}) uptakes are normal

Treatm nt

A Spec fi M res

1 Iodine th rapy (ea ly) If th nlargem nt is d.scovered ea ly it may disappe r completely with adequat iodine Fi e drops daily of s t rat d sol tion of pota sium iodid or

Strong Iodine Solution U S P Aqueous Solution of Iodine B P (Lugol s solution) in 1/2 glass water is adequate therapy Continue therapy until gland returns to normal size then keep on maintenance dosage or use iodized table salt

2 Iodine therapy (late) If the enlargement is of long standing iodine therapy as above may be used but n uch regression in the size of the gland should not be expected

3 Some clinicians use *Thyroid U S P B P 60 120 mg* (1 2 gr) in these patients especially if the goiter is multi nodular

B Indications For S rgery

1 Signs of pr sure If signs of pressure are present the gland should be removed surgically

2 Potential malignancy Surgery should be considered for any thyroid gland with a single nodule for the chances of a single nodule being malignant are quite high This is par *ticularly true in younger people and wh n there is no re* sponse to treatment

Prophylaxis

With an intake of 100 200 micrograms of iodine daily this con dition should not occur During times of stress (puberty preg nancy and lactation) the upper limits of this dose may prove neces sary This amount is satisfied by 1 2 Gm (15 30 gr) of iodized salt (1 5000 1 10 000 parts iodine) daily

HYPOTHYROIDISM (code No 810 7722)

Diagnosis

A Symptoms Farly weakness easy fatigability cold sensitivity

B S gn

1 Early These are few and may be difficult to find dry skin and hair brittle nails and menstrual disturbances are suggestive

2 Later Hai tends to fall o t (especially eyebrows) sweat ing diminishes face becomes puffy (early about the eyes) then non pitting edema spreads to the rest of the body Patient may develop anemia and heart disease

3 Obesity is an uncommon finding in true hypothyroidism

C Laboratory Diagnosis

1 Low B M R A B M R below −30% is suggestive but not diagnostic of hypothyroidism A low B M R does not neces sarily mean hypothyroidism *this is especially true in obese* pati nts (See Obesity p 390)

2 Serum iodine A low protein bound iodine of under 4 micro grams per cent

3 Decreased radioiodine (I^{131}) uptake (below 10% in 24 hours)

4 Other significant findings include elevated blood cholesterol (above patient s no mal) and in severe cases anemia

Treatment

A Sp cific Th rapy Thyroid *U S P B P is the preparation* of choice Initial dosag varies with the seve ity of the hypo thyroidism

1. Patients with sever myxedema myxed ma heart disease or elderly patients with hypothyroidism with othe associ ated heart disease Begin with small doses 15 mg (1/4 gr) d lly for 1 we k a d increase dose every week by 15 mg (1/4 gr) daily up to a total of 100 to 200 mg (1 1/2 3 gr) daily This dos ge should be conti u d ntil signs of hypo thyroidism have vanished o toxi symptoms ppear th n stabiliz dos ge so as to maintain the B M R o protein bound iodi at normal or just below the level of toxicity (see below und r Hyperthyroidism)
2. Pati nt with early hypothyroidism may be tart d with larger doses 30 mg (1/2 gr) daily increasing by 30 mg (1/2 gr) every week to the limit of tolerance
3. Chronic maint nance Each patie t s dos m t be adju ted to obtain the optimum eff ct M st patie ts requir 60 to 130 mg (1 2 gr) daily f maintenan e Optimum mainte na ce d s g can be estimated by f llowing B M R pro tei bound iodine and pla ma h lest rol but clinical judgme t is sually the best guide

B *Needle s l e of Thyroid*

1. Qu stionable diagnosi If any patient can tolerate bov 200 mg (3 gr) daily of thyroid the diagnosis of hypothy roidi m should be que tioned Normal individuals nd obe e and oth r non hypothyroid individuals can tol rate doses up to 300 to 500 mg (4 1/2 7 1/2 g) daily without cha ges in B M R or de lopme t of toxic symptoms
2. Non pecific u e of thyroid The u of thyroid medication as onspecific stim lating therapy is mentioned only to be condem d It has been hown that the doses usually em ployed (100 to 200 mg or 1 1/2 3 g daily) are ineffectual in alteri g the m taboli m of a normal individual

HYPERTHYROIDISM

In the past it had bee customary to lassify hyperthyroidi m rd ng to th gros anatomi al charact ri tic of the gland as

1. Diffuse Toxic Goiter (wh n as ociat d with exophthalmos G aves s disease) (code No 810 943 6)
2. Nodula T xic Goite (cod No 810 952 6)
3. Hyperthyroidism Without Goite (od N 810 771)

Howev since treatment i aim d primarily at the di t rbed physiology and sinc ther is no evidence that th re are any diff enc e in the lt red ph si logy th ir discussion unde the common h ading of hype thyroidism e em ju tifi d

Di gnosi

A Symptoms N rvous ss Irritability e sy f tigability and w gh loss in spit of ex ive appetit and food intak

B Signs

1. P tient se ms quick in ll his movem ts
2. W rm and moist skin
3. Fi e tremor of extremiti s usually pre ent in s re c se
4. Mark d w ight loss and ema iation
5. Goite (at tim s a bruit may be heard over gland)

6 In exophthalmic variety exophthalmos may be marked
7 Cardiovascular findings vary most common is tachycardia but in older patients especially with long standing hyper thyroidism cardiac failure and auricular fibrillation are not uncommon

C Laboratory Findings
1 Elevated B M R Elevated B M R may be present in other conditions such as fever malignancy (especially leukemia)
2 Elevated hormonal iodine Above 8 micrograms per cent is suggestive but this may be seen in pregnancy malignancy with excessive tissue destruction burns during iodine therapy and after therapeutic or diagnostic use of iodine containing organic compounds (e g drugs used for gall bladder or kidney visualization)
3 Increased I^{131} uptake may be diagnostic
4 The blood cholesterol level may be low

Treatment

Treatment is aimed at stopping the excessive secretions of the thyroid Several methods are in use and the method of choice is still open to debate and varies with each case The most widely accepted method however is adequate preparation followed by sub total surgical removal

A Subtotal Thyroidectomy This is probably still the method of cho ce since it demands the least in follow up care Adequate preparation is of the utmost importance One or 2 drugs are generally necessary for adequate preparation iodine and/or one of the thiouracil group of drugs
1 Iodine Has been used for years Iodine is given in daily dosages of 5 10 drops of Strong Iodine Solution U S P Aqueous Solution of Iodine B P (Lugol s solution) or satu rated sol tion of potassium iodide with nonspecific therapy (see below) until the B M R has dropped to below 20% the signs and symptoms have decreased and the patient has begun to gain weight The disadvantages with iodine are as follows
 a A few patients may not respond especially those who have received iodine recently
 b If there is too long a wait before surgery the gland may escape and the patient develops a more severe hyper thyroidism than before
 c It is generally impossible to bring the B M R to normal with iodine
2 Thiouracil drugs Recently several thiouracil drugs or similar derivatives hav been introduced They are Propyl thiouracil U S P B P Methylthiouracil N N R Methimazole N N R and one containing iodine in the mole cule iodothiouracil (Itrumil®) The modes of action of the first three are probably identical that of iodothiouracil is still not entirely clear
 a Propylthiouracil U S P B P This drug has been most widely used and appears to be the least toxic It is the thiouracil preparation of choice The mode of action of this drug is such that when given in adequate dosage

it pre ents the thyroid gland from incorporating inorganic iodine into its o ganic (hormonal) form This eff ct is very rapid (within a f w hours) a d conti ues a long as the drug is giv n The gland continues to attempt to man uf ct re th hormone (remains hyperplastic or becomes more so) but non is made Because of this the B M R invariably f lls the rate of fall depending upon the total qua tity of previously ma ufact red protein bound iodine available f om the gland or in the circulating blood (More prot in bound iodi e is present if iodine has pre viously been given) The rage time required for the B M R to return to normal is about 4 6 weeks If the drug is continued the B M R will continue to fall until the pati nt becomes myxedematous

(1) The drug appears to be ide l xcept for 2 f tors
   (a) Danger of toxic reactions especially granulocyto penia This apparently happens very infrequently with propylthiouracil and can be a ticipat d The patient is examined weekly and a weekly or bi weekly blood cou t taken If the WBC f lls below 4500 or if less than 45% gran locytes are present th rapy should be di continued Other rare re actions are drug fever and ash
   (b) The second objection is of a t chnical nature since the gland may remain hyperplastic nd vascular surgical removal is more difficult Because of this combined th rapy using propylthiouracil and iodine is probably the m thod of hoice in preps ing patie ts fo thyroidectomy (see below)
(2) Dosage Therapy is usually continued and a gery def rred until B M R is normal Th re is no need to rush surgery there is no da ger of esc pe as with iodine
   (a) In se ere cases 100 200 mg (1½ 3 gr) q i d is generally ad quate
   (b) I re cases espe ially with very large glands la ger doses may be necessary
   (c) In milder ca s 100 mg (1½ gr) b i d may be used although th larger dose are not more harm ful

b M thylthioura il N N R is almost the s me as propyl thiouracil in mode of a tion and dosage Toxic rea tion may be more frequent

c M thimazol N N R (Tapazol ®) The a tion of this drug is similar to that of the thioura ils The dosage is about 1/10 1/15 that of propylthioura il The a erage dose is 10 15 mg (1/6 1/4 gr) ve y 8 hou s The maller dosage is no guarant e against toxic re ctions which may be more common with this drug than the thiouracils

d Iodothiouracil (Itrumil®) This iodinated thioura il is claimed to be non goitrogenic Although some favorabl reports have been published the e have be n eports of gradual scape whil on the drug as w ll as ca es of postoperative cri is Dosage 100 300 mg (1½-4½ gr) t i d to q i d

3 Combined propylthiouracil iodine preparation The advantage of this method is that one obtains the complete inhibition of thyroid secretion with the involuting effect of iodine This can be given in 2 ways
   a Propylthiouracil followed by iodine This appears at present to be the method of choice Begin therapy with propylthiouracil about 10 21 days before surgery is contemplated (usually B M R about +20) begin the iod ne and contin e for 1 week after surgery
   b Conco nitant administration of the 2 drugs from the start in dosages as for the individual drugs i e 100 200 mg (1½ 3 gr) propylthiouracil q i d and Strong Iodine Solution U S P Aqueous Solution of Iodine B P (Lugol s solution) 10 15 drops daily

B Continuous Propylthiouracil Therapy (Medical Treatment) Control of hype thyroidism with propylthiouracil alo e w thout surgery has been advocated by some
1 The advantage is that it avoids the risks and postoperative complications of surgery e g myxedema hypoparathyroidism
2 The disadvantage is the possibility (highly improbable) of toxic reactions (see p 371) plus the necessity of watching the patient carefully for signs of hypothyroidism Since the advent of propylthiouracil it appears that the possibility of toxic reactions is slight The patient must report to the physician if fever sore throat or dermatitis develop
3 Dosage
   a Begin with 100 200 mg (1½ 3 gr) t i d to q i d and continue this dosage until B M R is normal and all s gns and symptoms of the d sease have subsided then place the patient on a maintenance dose of 50 75 mg (¾ 1¼ gr) daily keeping check on the B M R or protein bound iodine to avoid hypothyroidism
   b An alternative method is to continue with doses of 50 200 mg (¾ 3 g) t i d to q i d This will b ing the patient to hypothyroid levels keep his B M R or protein-bound iodine normal with thyroid (This may be the preferred treatment of exophthalmic goiter see p 373)
   c Duration of therapy The duration of th rapy and recurrence rate have not b en completely worked out However at present it would se m that of the patients kept on propylthiouracil betwe n 6 and 18 months (the do age slowly decreased) about 50 to 70% will show no recurrence of hyperthyroidism Increasing the duration of therapy to about 2 years or more does not increase th cure rate

C Radioactive Iodine (I^{131}) The administration of radioiodine has proved to be an ex ellent method for ablation of over functioning thyroid tissue The rationale of treatment is that the radioiodine being concentrated in the th y oid will destroy the cells that concentrate it Its use may be lifesaving in cases of thyroid carcinoma when the cancer tissu can take up iodine Because special technics are necessary to measure and handle the I^{131} the method is still generally limited to larger medical centers The only objections to date to I^{131} the apy are the

possibility of carcinogene is (which has not yet been observ d) and th possibility that an early carcinoma which might be r moved s gically may remain ndetected Be a se of th above factors its us should generally be limited to older ag groups (50 or above)

D C ti uous Iodi e Therapy In the past this method w s s d in some le s mild ca es of hyperthyroidism with f i r s Its howe er beca se of the da ger of escape nd because of the discovery of propylthiouracil iodine should b used only for preop rative pr paration

E X ray Th rapy Has been s d in skill d hands with good ult as batitute fo s rge y but bec use of the t me nec ssary to obtain complet eff t (3 6 months) this mod of th rapy should be reserved fo sel cted cas s It i rarely i dicat d when I[131] i available

F G neral M s res

1 R st The patient with hyperthyroidism should be t b d rest e pecially in a v re ca s and in preparation for s gery With the d ent of p opylthio racil mild r as s being treated as ambulatory patients Howe er e rly bed r st hast ns recovery

2 Di t Diet should be high in calo ies pr teins and v t mi s Th e pati nts cons m great quantiti s of food are ge erally in negati e nitrogen balan nd e d the ex e s foods and vitamins bec se of thei i re sed m tabolic needs S ppl m ntal vitamin B compl x should gen rally be empl yed

3 S dation When first s en th e patients re oft n ery n rvous Sedation is always h lpful nd v ry la g qua ti tie may be nece sary t ont ol symptom Ph nobarbital U S P Ph nobarb tone B P 30 mg (1/2 gr) 3 6 tim s d ily may be n s ry

4 T stoste on propionate This drug has be shown to be of lue in rest ring positive nitrogen balanc in thes pat nts Give 25 50 mg (3/8 3/4 g) I M daily or 2 3 times per w ek Do ot s m thyltestosterone in hyperthyr idi m s this aggravat s the creatin ia and seems to ggra ate the hype thyroidism

G Tr tm t of Compli tion

1 E ophthalmos The sa t c u e of e ophthalmos is still un known Although it may be d e to x essive s cretio of thyrotropic o other ant i r pituitary hormone the vi d nce is still inconclusive It ha been shown that xophthal mos is due t edema and later ellula infiltrations of th periorbital tissues (muscl connecti e tiss e f t etc) Removi g th thyroid secretion (by extirpation o admini tration of propyl hiouracil) doe not nec e ily help t is ondition and may aggravate it le ding t malignant xo phthalmo It has be n suggested that this i d e to th f t that the thyroid secretion rt an inhibitory ff ct on the nterio pituitary removal of the gland all wing the a t rior pitui ry to s cret more hormone and aggravat the condition Som inve igat rs beli ve that xophthalmos occur with hype thyroidism becaus the thyroid secretion in hyperthyroidism may be abnormal and be a this

abnormal secretion does not have any pituitary depressing effect Therefore it would seem rational to treat this con dition by giving thyroid orally

a Thyroid dosage - Immediately after surgery or after B M R has *returned to almost normal (+20%) with* propylthiouracil therapy begin giving thyroid 100 200 mg ($1\frac{1}{2}$ 3 gr) daily Give dosage adequate to maintain B M R at about +20% *This therapy should be used* whenever there is a tendency for progression of the exo phthalmos although it is not always effective

b *Physical protection of eyes - Dark glasses* protection from dust eye shields tarsorrhaphy and other meas ures may be necessary Ophthalmogical consultation *should be requested*

c ACTH or adrenal steroids The use of these agents in large doses has been proposed In some cases they have *proved helpful They probably* act by reducing the in flammatory reaction which occurs in the peri orbital tissues

d Surgery of malignant exophthalmos - Every patient with exophthalmos should have actual and periodic measure ments made with an exophthalmometer One should not rely upon clinical judgment to determine whether or not exophthalmos is present or progressing In severe pro gressive cases where corneal edema limitation of extraocular muscle movements and failing vision occur it becomes practically a surgical emergency to s ve the eyesight The operation of choice is orbital decom pression

2 Cardiac complications Whether or not thyrotoxicosis itself can cause heart disease is still unsettled however a num ber of cardiac complications are at times associated with hyperthyroidism

a Tachycardia Some degree of tachycardia is always found if normal rhythm is present in thyrotoxicosis This requires only the treatment of the thyrotoxicosis

b Congestive failure This tends to occur in long standing thyrotoxicosis especially in the older age groups Ther apy is the same as fo congestive failure from any cause Digitalis seems to be effective in congestive failure asso ciated with thyrotoxicosis (see p 197)

c Auricular fibrillation May occur in association with thyrotoxicosis Treat as any other auricular fibrillation but do not try to convert the auricular fibrillation in a toxic patient Most cases will revert to normal rhythm soon after toxicity is removed However if fibrillation remains for 2 weeks after surgery or for 2 4 weeks after B M R has returned to normal using propylthiouracil therapy one should consider use of quinidine to convert to a normal rhythm (if no contraindications are present) (see p 200)

Crisis or storm Fortunately this condition is rare with modern forms of therapy It occurs now mainly with inadequately thiouracil iodine treated patients immediately after subtotal thyroidectomy It is characterized by

hyperpyrexia tachycardia and C N S hyperirritability and delirium The cause is uncertain b t absol te or relative adrenal cortical insuffici ncy may be important

a Ge eral tre tment Attempt to control the hyperpyr xia with cold packs and the hyperirritability with sedation

b Specific measure There is no certain specific therapy Howe er the use of large doses of whole adrenal cortic l extract cortisone and corticotropin (ACTH) may be life saving The administration of large do es of sodium iodide 1 2 Gm (15 30 gr) I V and r peated every 12 24 hours has been dvocated

DISORDERS OF CALCIUM AND PHOSPHORUS METABOLISM

NORMAL CALCIUM AND PHOSPHORUS METABOLISM

C lcium.

A Im h... Calcium is ordinarily d rived from the diet Average dult di tary intake is 0 5 0 8 Gm (7½ 12 gr) daily a d is normally ad quat During pregnan y and lactation the re quirements are higher the range being 1 5 3 0 Cm (22½ 45 gr) daily

B Abs rption Calcium is absorbed in th small int stine S al factors influenc calcium absorption

1 Vitamin D Need d for proper abso ption
2 Presence of fatty acids or rtain minerals (magnesium potassium) may interf re with calcium absorption
3 pH of intestine In reas d acid favors absorption
4 Diseas s of the GI tract (g chronic diarrh a pa creatic d ficiency) which dist b motility and interf re with bsorption

C I t rm d ry M t boli m

1 Blood Cal ium exi ts in plasma in 2 f rm a diffusible fraction (45 60%) containing the ionizable active material and a non diffusible which is bound to th globulins When blood calci m val es are reported these are the total (diffusible and non-diffusibl) cal ium and m y be low whe protein l vel is low but the physiologi lly active ionizable portion may be normal therefore always d termi e serum prot in when serum calcium is dete mined
2 Bone Bone is a very actively metabolizing tissu Th re is consta t bre kdown or res rption (ost oclastic activity) constant new bone matrix formation (steoblasti activity) and constant calcifyi g of this m tri The activity of building up the new bone (osteobl sti activity) is a sociated wi h th pres nce of alkaline phosphatase enzyme and its liberati on into the blood this en yme is incre s d wh n ost obla tic activity is incre sed
3 Ex retion Calcium is excreted in the uri e and stools Most of the stool calci m is d riv d from unabsorbed di tary cal ium and vari with cal ium intake and absorption The rinary alcium vari s with the amount bsorbed but th va iation is not as gre t as with the stool calci m

HYPOPARATHYROIDISM (Unknown Cause code No 820 x10) *(Injury due to Operation code No 820-415 x)*

A deficiency of parathyroid hormone usually occurring post operatively following thyroidectomy or surgery for pa athyroid tumor or hyperplasia *It is characterized by muscle weakness* irritability tetany a low blood calcium high or normal blood phos phorus *normal phosphatase and normal bones by x ray (except* after removal of parathyroid tumor) Cataracts may occur par ticularly in young persons

Treatment

A Emergency Treatment for Acute Attack (Hypoparathyroid Tetany) Us lly postsurgical a d requires immed ate treat ment

1 Calcium Chloride U S P B P 5 10 cc (1 2½ dr) of 10% solution I V slowly until tetany ceases or Calcium Gluconate Injection U S P B P 10 30 cc (⅓ 1 oz) of 10% solution I V may be given 10 50 cc of either solution may be added to 1000 cc of 5% glucose in water or saline and administered by slow I V drip The rate should be so adjusted that hourly determination of urinary calcium by means of the Sulkowitch test will be positive

2 Parathyroid Injection U S P 50 100 units (½ 1 cc) I M or subcut 3 5 times daily as necessary to prevent tetany Do not use parathyroid hormone fo over one week because refractory state tends to develop rapidly Use only as long as absolutely necessary Actually parathormo e is rarely ever used it is not very practical and usually not necessary

3 Calcium salts should be given orally as soon as possible calcium gluconate 4 Gm (60 gr) q i d calcium lactate or calcium chloride 2 3 Gm (30 45 gr) q i d

4 D hydrotachysterol *(A T 10) should* b given as soon as oral calcium is begun Begin with oral dose of 4 10 cc (1 2½ *dr) of oily sol (1 25 mg per cc) daily for first 2 4 days* then reduce dose to 1 2 cc daily for 1 3 weeks and th n *determine patient s maintenance requirements*

B Maint n nce Treatment

1 *High calci m low phosphorus diet (omit milk)*

2 Calcium salts as above may be continued (except calcium chlo ide)

3 Dihydrotachysterol (A T 10) ½ 1 cc daily or 3 times weekly to maintain blood calcium at normal level

4 Calciferol U S P 2 5 mg daily In some cases up to 7 or 8 mg calciferol daily may be substituted for dihydro tachysterol Vitamin D action is probably similar to that of dihyd otachysterol and it can certainly be s bstituted ade quately clinically The initial action of vitamin D appe rs to be slower However the cost to the patient is l ss than using dihydrotachysterol and the margin of safety is prob ably greater Regulate the dose by daily Sulkowitch test which should run 1 2+

5 In some patients probenecid (Benemid®) *in doses of 2 4 Gm* (30 60 gr) daily *has been shown to block the t bular re* absorption of phosphate and hence to lower serum phospho us

and help restore s rum calcium levels t normal in thi con dition

6 Aluminum hydroxide gel may be employed to help lower the rum phospho us (see p 302)

OSTEOPOROSIS (Senile Osteoporosis code No 200 798)

Osteoporosis occ rs most comm nly in postclim cteric patie ts It is al o f und associated with other cond tions le ding to general iz d tissue atrophy e g m lnut ition particularly du to low prot in i take Cushing syndrome excessive use of corticotropin (ACTH) or c rtiso e di se atrophy (whe e stimulus to o teog nesis i abs t) cromegaly or may be idiopathi

The first complaint is u ually backa h There is x ray e i d nce of raref tion e pe ially i lumba v rteb ae a d pelvis and oft n collapse and fractu e of v rtebral bodies Other pathol gic l fractures may oc r The blood alcium phosph us and alkaline phosphatase are n rmal

T atm t

A Spe if c M a res Vary with the caus but combined hor m th apy is usually indicated

1 Postclim ct ric (mo tly in f males)

a Estrogens may be of val e in stimulating osteoblasts B fore beginni g stroge ther py in a postm nopa sal woman p rform c reful pel i examination to r l out n oplasm or oth r abnormality and warn pati nt or a relative that vaginal bleeding may occ r Administ r estr gen daily pt for fi st 5 or 7 cal ndar d y of each month and then repe t cycl

(1) Diethylstilbe trol U S P Stilboe trol B P 0 5 2 0 mg daily as tol rated

(2) Ethinyl Estradiol N N R 0 02 0 05 mg daily as tol rated

b Te tosterone For its prot in anaboli effect and henc its tend ncy to lay down bon matrix testosterone may be ed in addition to e trogens Give 10 20 mg methylt stosteron orally *Avoid overdosage* in f males excessive use may c use ppearanc of m l s ondary sexual characteristics However these will regress if ther py is stopped

2 Old age and idiopathic A for po tm nopa sal both t sto te one and e troge should be u ed in both mal and f male

3 Patients with malnutrition Ad quate diet i of g t im portance However the hormones may be used a abov if respons to di t a one i poo

4 Cushing's dise se (s e p 383)

B Ge ral M

1 t Should be high prot in high c l ium (milk nd milk products e already) Vitamin suppl men a e pecially vit min D 2000 5000 units da ly may be giv also

2 A tivity Patients should be k pt a tive If bed r st is un avoidab an os illa ing bed hould be used

OSTEOMALACIA (code No 200 7642)

Osteomalacia results from calcium deficiency due to any cause In ad lts these include *vitamin D lack or resistance (rare) and* sprue syndrome or pancreatic disease Chronic renal disease may also produce osteomalacia but more generally produces secondary hyperparathyroidism

Rickets (code No 010 764) is the childhood type due to inade *quate intake of vitamin D Laboratory findings include* a *low or* normal serum calcium o a low or normal serum phosphorus (exce| in renal disease where it may be elevated) and most characteris tically an elevated phosphatase

Tr atm t

A Specif c Therapy

1 Ri k ts Vit min D even in small doses is specific 2000 5000 units daily are adequate

2 Adult osteomalacia and Milkman s syndrome Vitamin D is *specific but very large doses are necess ry to overcome* the absorption d fect Give until an effect is noted on blood calcium Usual dose is 25 000 100 000 units daily Doses up to 300 000 units daily may be necessary b t if the doses are over 100 000 daily they must be used cautiously

3 *Pa creatic insuff ciency (see p 289) Adequate replace* ment therapy is of paramount importance High calcium in take and vitamin D 2000 10 000 units daily are also of value

4 Sprue syndrome Folic acid and vitamin B_{12} appear to be *of value (see p 226)*

5 Some rare forms of renal disease Treatment is aimed at the altered renal physiology

B G n al M s r s, High calcium diet and calcium gl conate calci m lactate or calcium chloride 5 20 Gm (1 5 dr) daily

ADRENAL CORTEX

ADDISON S DISEASE (Adrenocortical Insufficiency)
(Due to Tuberculosis code No 860 123 x)
(Undetermined Cause code No 861 782)

A disease due to lack of secr tion of adr nal cortex caused by tuberculous destruction of the gland surgery or undetermined factors *it is manifested by asthenia anorexia a d other GI dis* turbances hypotension and pigmentation usually brownish of the skin and mucous membranes This pigmentation is mainly an ac centuation of alre dy pigmented areas and a depo ition of pigment in skin creases

The laborato y findings include a low blood sugar incre sed insulin s nsitivity low blood sodium and chloride elevated potas sium elevated N P N and a positive water test There a decrease of 17 ketosteroid excretion in the female and l ck of response to ad enocorticotropic hormone in primary Addison s *disease*

Treatm t

A Spe ifi Therapy (Chronic Cas)

1 Co tiso o hyd ocortison The drugs of choice at present Mo t Addisonian patients are w ll maintained on dosages of 6 25 25 mg (1/10 3/8 gr) daily given in divided doses 3 to 4 times daily orally On this dose most of the metabolic ab normaliti s are corrected Some patie ts howev r do not obtain sufficient salt retaining effect and they require some D O C A suppleme tation or extra dietary salt

2 Desoxycorticosterone Ac tate B P (D O C A) U S P D oxycorton Ace tate The effect of this d ug is limit d to controlling l ctrolyte balan e and has no oth r significant metabolic effect

a I M administration of D O C A may be used initially but is rarely necessary The usual dos for s pplemen tation i 1-4 mg daily When the response has been ade quate (e below) hange to buccal use

b Buccal use of D O C A (hard compressed tabl ts con taining 2 mg of D O C A in carbowax) One tablet daily o at most 1 tablet twice daily will give adequate suppl m ntati n The tablet is placed betw n cheek and teeth nd allowed to dissolve The dosage of subcutan ous and buccal route is almost id tical

Desoxycortison trimethylac tate 25 75 mg I M once monthly may be u ed instead of D O C A (25 mg I M once monthly is roughly equivalent to 1 mg D O C A in oil per day)

CAUTION Wheneve sing D O C A avoid overdosag Also do not have pati nt on low potassium di t when giving D O C A f r patient may develop signs of potassium d fi iency

3 Sodium chloride in larger dose (5 20 Gm daily) may be used to s ppl ment co tison in the abs nce of D O C A

3 Ge ral M s re

1 D et

a High c rbohydrat and high prot in intakes are very im portant

b Frequent small f dings rathe than 3 large ones tend t be better tol rat d

2 A oid exposure to inf tion nd t eat ll infections immed iat ly and vigorou ly

3 Te tost one Methyltestosterone 10 20 mg daily orally o t tost rone propionate in oil 10 25 mg I M three times we kly i oft n helpful f r its prot in anabolic ff ct s well as f the onsp cLi f eling of well being it ind ces in the debilitated pati t

Crit ria of Ad quat Therapy and Ov rdosage

A Ad quate The py

1 Ret rn of blood pre s re to normal M y r quire up to 3-4 months with ad quat th rapy

2 Maintenanc of normal fasting blood suga level

3 R t rn of plasma electrolytes to normal l vels

4 W ight gain (usually due to fl id)

5 Improv me t of appetite and of general tre gth

6 *Increase in size of heart to normal*

B Overdosage Must be watched for and avoided very carefully *especially in* patients with cardiac or renal complications
  1 Signs and symptoms of cortisone overdosage (see p 423)
  2 *Development of dependent edema* or excessi e weight gain
  3 Development of hypertension
  4 *Increase of diameter of heart* above normal
  5 De elopment of signs of potassium deficiency (weakness *followed by loss of m scle power a d finally paralysis*) especially if patient is on a low potassi m diet

T e tment of Ad enal Crisis (Acute Adrenal Insufficiency)

The adrenal crisis is an *emergency* The patient *must be* treated vigorously and observed constantly until well out of danger *Overtreat rather than undertreat*

A Seve e C isi
  1 Emergency treatment
    a Anti shock measures Combat shock by use of appropri ate adjunctive measures (see p 31) especially plasma vasopressor drugs and oxygen Do not use narcotics or sedativ s
    b Hydrocortisone Administer hydrocortiso e free alcohol (Infusion Concentrate Hydrocortone®) 100 mg in 1000 cc 5% glucose in physiological saline sol tion by I V infusion over a period of 1 to 3 hours An additional 50 100 mg of hydrocortisone may be added to subsequent infusions during the first 24 hours if necessary (If parenteral hydrocortison is not available give aqueous adrenal cortical extract 25 50 cc I V immediately and follow with 100 200 cc aqueous adrenal cortical e tract in 1000 cc saline dextrose infusion)
    c Cortisone acetate *Give initial* cortisone acetate 10 25 mg I M in four different sites (total 40 100 mg) *Follow with single injections of cortisone 25 50 mg I M* every 6 hours and gradually lengthen intervals of admin *istration to 25 mg every 8 ho rs*
    d Subsequent parenteral fl ids After the first I V infusion *mentioned above is completed* it should be followed im mediately by 1000 cc 10% glucose in physiological saline solution (includi g additional hydrocortison as mentioned above) The total fluids in the first 24 hours and d ily thereafter should not be greater than 3 liters in o der to avoid excessive administration of sodium
    e Anti infective m asures If infection is present t eat int nsively with indicated a tibiotic
  2 Convalescent treatment When patient is able to t ke food by mouth place on oral cort sone 12 5 25 mg very 6 hours and reduce dosage to maintenanc levels as needed

B Mode ate Crisis If the patient s physical condit on does not appear to be critical and is not associat d w th a signif cant degree of shock the treatment o tli ed above may be *modifi d* by appropriate reduction in dosage However it is gen rally best to overtreat the patient *in moderate crisis during the fi st* 24 hours rather than risk ndertreatme t

C Complications Arising *During Course of Treatment of Crisis*

1 Overhydration Ove hydration usually due to sodium re te tion m y result in c eb al dema (with ncon ciousness or c nvulsions) o pulmonary d ma Withhold sodi m and fl ids t mporarily and treat for thes condition (ee p 21)
2 Hypokal mia Fla cid paralysis with low serum K usually oc urring on 2 d 4th days of treatment m y be t eat d with K salts (see p 21)
3 Hyperpyre ia This complication is rare with pre ent tr at m nt method (See p 30 for th rapy)
4 Fo the omplications of ad enal steroid the apy (g psychoti rea tions) s p 423

CUSHING S SYNDROME (Adrenocortical Hyperfunction) (Pituitary Basophilism code No 841 7763) (Adrenocortical Hyperfunction code No 861 7813)

A hroni and if ntreated a us ally f t l dis ase due to hyperf nction of the adrenal c rt x c us d by p m ry hyperpla ia o t mo or d e to adrenal hyperpla ia second ry to ante ior pitu t ry hyperfun tion The underlying physiol gical d turbanc i pr bably n overs retion of th ad enal co t x It is manif st d by a thenia like) s retion of th taboli (glucone g ni corti one w ight gai sy b uissbility ab ormal f t d position bout f c ne k and trunk ost oporo is hypert sion abd minal stria s xual dystrophy (m h s with mild t ill m in fem l s and t ti ia trophy in m les) nd in ulin resistant d abetes Th r is n exce iv x retion of inary 11 oxysteroid nd at times of th 17 ketost roids P rirenal or retroperitoneal gas in ufflation m y re eal a tumo which may be removed s gic lly A low osi ophil ount is found in the blood sually below 50 per cu mm

T atm n

In evaluating the results f thera y in t is disea e great caution must be a plied f r the disease may be subject to spontaneous remi si ns that may la t for years

A Spe ifi Therapy

1 S g l removal of the tumor or total or btotal resection of both adrenals in the case of diffus bilateral hyperplasia is the pres nt treatm t of choi e Adequat preoperative medication and care i of atmost importan e The pati t should receive ll general measures li ted below plus ade quat hormonal supplementation

a I s of unilat ral tumo where s rgery is indic ted preoperati preparation with corti otropin (ACTH) should be c rried out well s cortisone therapy s for bilat ral adrenalectomy (see below) The ACTH tim lat the non tumorou adrenal ortex whi h is generally atrophi d Treatm nt wi h de reasi g doses of ACTH should be conti ued postoperativ ly for 7 14 day

b If bila ral drenalectomy is ont mplated give high dos s of cortisone 100 3 0 mg (1½ 4½ g) orally as well as 100 300 mg I M for 3 5 days preoperatively continue the I M and poss bly the oral dosage d ing and

after surgery After surgery gradually decrease the dose and maintain the patient as a chronic addisonian patient (see p 381) Because of danger of precipitating heart failure care must be exercised to avoid excessive fluids and sodium

2 X ray therapy to the pituitary may be of value only in rare cases of hyperplasia

B General Measures

1 Diet High protein diet should be given although dietary attempts to correct the negative nitrogen balance are doomed to failure

2 Hormones

a Testosterone has been of value in reversing the negative nitrogen balance and possibly in suppressing the pituitary secretion of adrenocorticotropic hormone thereby aiding certain features of the disease (namely asthenia fat distribution osteoporosis and striae) and possibly in prolonging life For this testosterone propionate in oil 25 50 mg daily I M has been found necessary

b Insulin is usually of little or no value in controlling the *glycosuria and hyperglycemia Insulin is usually unnecessary* as the diabetes is quite mild

VIRILIZING DISEASES OF FEMALES
(Due to Tumor code No 8041)

In the adult the virilizing or masculinizing disease is usually caused by a tumor arising in the adrenal ovary or from cell rests of one of the above tissues It is characterized by excessive hirsutism (especially of male type) amenorrhea enlargement of clitoris deepening of voice excessive musculature and ex essive 17 ketosteroid excretion Surgical removal of the tumor is the treatment of choice

Another form of the disease begins in childhood It is due to over production of androgen type hormones from bilaterally hyperfunctioning adrenal cortices In many of these patients there may be associated manifestations of hypoadrenocorticism (i e excessive salt and water loss and failure to maintain a fasting blood sugar) Treatment with cortisone or hydrocortisone has proved valuable in reducing the activity of the glands (apparently through suppression of endogenous ACTH) and in supplying exogenously ne ded cortisone Dosages necessary have ranged from 20 50 mg (1/3 3/4 gr) daily *orally in divided doses Some investigators feel that the same dose* of cortisone acetate by the I M route may be more efficacious in this syndrome

Most cases of excessive hirsutism in females are not due to *endocrine disease* but to hereditary o racial f ctors and should not and cannot be treated by any internal medications or surgery

HYPOGONADISM

Hypogonadism is due to a failu e of the sex glands to elaborate le t quantities of their hormones to bring about or maintain the of secondary sexual characte istics

MALE HYPOGONADISM

Eti logy

F il re of the gonads may result from s veral ca ses This f llure m y be primary (i e due to t aticula dise se) o second ary to malfunction of other glands most often the pituitary or thyroid

A Testic lar Hypogonadism (Eunuchoidism) (code No 755 787)
B Male Climacteric (cod No 806)
C Congenital Hypoplasia of Testicles (cod No 755 016)
D Degeneration of the Test s Due to Infection (code No 755 100 9)
E Necrosis of Testis due to Trauma (code N 755-400 1)

Diagnosi

Th physiological diagnosis of the tiology of hypogonadism (e g primary or secondary) is usually based on labor t ry tests

Type of Hypogonadi m	U inary 17 Ketosteroids	U inary Gonadotropins
P imary	Low o norm l	El vat d
Se ondary Pituitary	Usually low but m y be normal	Very low
Anorexia N rvosa	Low or normal	Low n rmal Not generally a low pituitary type
Thyro d (T rtiary?)	Low o normal	Low

Many clinic l syndromes have be n des ibed but basi lly they all fall into one of two c tegories The differences are out lined below

A Prepubert l Type *Should not be diagnosed before 18 ye r f a e* Thi is a f il re of developm t of normal t sticular function and is manif ted by small o bsent t st icl s small penis la k or diminution of axillary and pubic hair la k of m scula development often younger bone ge than chronologi al ge

B Postpube tal Type Loss o ce sation of normal te ticular function (urgi al traumatic infection x ray and "male climacteric) Appare tly the "normal ce sation of testicu lar function in the male i not generally as ac te and t nds to occur much later in lif than the cessation of ovarian function in the femal However at l a t in some men there i a rather apid essation with the dev lopment of symptoms as i f male menopause (se p 388)

Tre tm t

T tos rone (the male sex hormone) is the drug used for re pla m nt therapy in th m le (For preparations availabl se p 433)

A Prepuberial Hypogonadi m Adequate tes ost rone therapy can

make these individuals into normal adult males in every way except that they cannot produce sperm These patients must be placed on testosterone and maintained for life on adequate doses of testosterone There is little evidence that any pituitary s b stance or gonadotropin is of significant value in treating these patients (see pp 412 413)

1 Any of the testosterone preparations may be used but the free testosterone pellet implantation in experienced hands seems to be most useful The dosage (numb r o p llets) is as follows 300 mg (5 gr) is the minimal but an effective dose Average is about 600 mg (10 gr) For maximum effect about 900 mg (15 gr) are implanted The pellets are implanted subcutaneously with a trocar or into a pocket made by blunt dissection Either the inferior scapular area or ant rior thigh area is used Testosteron pellets remain and are effective for 3 4 months and then must be repla ed
2 An alternative method is the oral or sublingual adminis tration of methyltestosterone This requires daily adminis tration of the drug to the patient and entails all the d fficulties of prolonged oral administration Dosage varies with var ious individuals but 10 25 mg (1/6 3/8 g) daily orally is usually ad quate dosage to cause maturation and virilization and maintenan e of this state Evidenc now indicates that there is no advantage of t uccal over oral administration
3 Long acting testosterone preparations T stoste one cyclo pentylpropionate (Depo testosterone®) 250 500 mg I M every 2 4 weeks may also be employed

B Postpubertal Oral use of methyltestost rone is probably the method of choice The dosage necessary to control symptoms and to aid in ov rcoming th protein loss and debility of age is often as low as 10 20 mg (1/6 1/3 gr) daily This dose may be used for a short period of time to control symptoms or may be continued indefinitely for control of symptoms and for its pro tein anabolic effect

FEMALE HYPOGANADISM

Th most common symptom of female hypogonadism is amen orrh a However most cases of relative am nor hea a e not due to hypogonadism

AMENORRHEA (code No 761)

Etiology

No mal m natr ration depends on many factors From the functional point of view there must be an intact pituitary gonad uterine axis Any break in the cycle of production of the various pituitary or ovarian hormones concerned with normal menstruat on or the lack of an endometrium capable of response to ovar an hor mones will result in ameno rhea Treatment is based in gr t measure on the level at which th disturl ed physiology exists

D agnosi

F llowi g a compl te w k p special t ats m y b n e sary
The usual ord of special diagnosti steps and their int rpretation
i s follows

A. Te t F r E trog n Prod tion. Adm nist r 10 25 mg (98 3g g) progest one I M o 60 120 mg (1½ 2 gr) of p g ste on o thi tero orally daily for 5 d ys
1. If bl ding occurs within 48 96 ho s aft the last dos it is i dic tive of endog nous trogen p odu tion
2. If no bleeding oc u s this indi at s e trogen lack o b sence of functional g endomet i m In that cas gi estro gen a bel w

B. T st F r E trog La k. Administ 1 mg d ethylstilbestrol o 0 1 mg th yl tradiol daily for 10 days
1. If bl ding occ rs within 72 96 hou s after d g it indic t s the p es nce of but lack of e dogenous e trogen productio
2. If bl edi g oc with est og the apy only det rmine ponal ation of the rinary gonad tropins ndom tri m A (bov) if a lly available If not perform not sooner than 3 w k aft dministration of estroge s This procedure may be done before
No mal 10 50 mo units/24 hou s
Lnd r 5 units/24 hours prima y pit itary f ilure
Ov 75 units/24 hou prim ry ov i n f il r

C. Othe P or d re
1. Ba al body temperature rec rd m t ial biopsies a mainly of val gnal am r and endo pon to proge terone to determine wheth ovulation and the normal yclic (estroge prog sterone) patt rn is being f llowed
2. Exploratory laparotomy Will h lp wh n diagnosis till is in doubt

Treatm

The aim of therapy of amenorrhe is not to caus the ppear nc of m nses (xcept f psychological re sons) but to att mpt t re tore rep oductive function

A. P ima y Am rrhe (No Previ M struation). This should n t be di ors d if patient is und r 1 ye rs of age
Tre tment of this condition diff r littl from secondary am norrhea These r ses are ually du to o genic pathology whi h should be o re ted If se ondary s ual haracterist s have not de eloped strogens alone may be of val

B. Secondary Am no rh Treatme t depends on und lyi g b no mal physiol gy
1. Specific me sur s It is not ece s ry t tre t all cases of menor he especially amenorrhea or irregular m se in young unmarried gi ls o wom These will generally be come orrected aft r marriage o first pregnancy
In c se with normal re pons to progest rone the ad ministra ion of th ho mone for the last 5 days of h month orally o parent rally (s e p 422) will corre t the ameno he
b. In es unre ponsive to proge t rone
(1) With low u inary gonadotropins Although gonadotro p s would appea to be of value tually they are

not (see p 413) Employ estrogen alone or in combination with progesterone (see p 422)
(2) With high urinary gonadotropins Gonadotropins are likewise of no value treat as above

2 General measures
   a Adequate diet and dietary treatment as needed to correct abnormal deviation of weight
   b Psychotherapy in cases of emotional disturbances
   c Correction of anemia (see p 219)
   d Correction of any other metabolic abnormality (e g hypothyroidism)

MENOPAUSE

Etiology

Failure of the ovaries may result from several causes most common of which are the natural menopause and menopause due to surgical removal or to x ray The failure may be secondary to malfunction of other glands most often the pituitary or thyroid

A Menopausal Syndrome (code No 805)
B Artificial Menopause D e to Roentgen Rays (code No 788 471)
C Hypofunction of Ovary Due to Unknown Cause (code No 788 x10)

Diagnosis

The menopause is due to a loss of ovarian function and is manifested by vasomotor disturbances (e g hot flashes) nervousness emotional instability and amenorrhea Abnormal uterine bleeding may occur in the natural menopa se before ame orrhea sets in

Tr atment

A Natu al M nopause The menopause in the female is characterized by at least 2 important fa tors *physiological* f ilure of ovarian function which occurs rather rapidly in the female and *psychological* recognition of the fact that reproductive life is at an end Many believe that as a result of this there is a marked change of life an implication that in addition to cessation of reproductive function there is complete alteration in one s way of life sexual activities personal interrelationships etc *This latter belief is entirely erroneous* Most women go through the menopause without any difficulty in fact without symptoms However in those having symptoms one must carefully evaluate the role of the physiological and psychological fa tors before beginning any therapy Most cases will have a mixture of physiological and psychological factors

1 Physiological aspects (estrogen therapy) There are certain symptoms that seem undoubtedly to be d e to the cessation of ovarian function the most prominent being vasomotor instability (e g flushing) Another may be the feeling of tension especially fullness in the head In women who suffer primarily from symptoms of essation of ovarian function use of estrogens is indicated The dosage and method of administration used depends on whether or not the patient is still menstruating

a If patie t has regular pe iods sh probably is manufac tu ing s fficient estroge and do s not n d therapy
b If cycles are v ry i regula and the pati nt suff rs f om menopausal symptoms estroge s given in yclical f shion may b h lpful Begin estrogens abo t 5 days afte onset of last m nstrual period and continue in a cyclic fashion Ethi yl Estradiol N N R 0 05 mg o Diethyl tilbestrol U S P Stilboestrol B P 0 5 mg by mouth daily ex pt f the first 5 days of each month This is simple fo pati nt to remembe
c If patient has becom ameno he l there is no reason to gi e t ogens in dose larg enough to rein titute m nses b t only to control symptoms
d Duration of th rapy This has not be n tandardiz d and m st be adjusted to the individual cas Thre months to 1 ye r s lly uffic s
e Maint nanc dos for life Be a s of the anaboli eff ct of estr gens and be ause of their known be ficial eff ct on alci m metabolism trogen th rapy ha be n recom me ded fo the duration of lif fo women beyond th menopa se The advisability of this pra tice will un doubtedly not be settled f a long tim

If a patient is on long term e t ogen therapy sh should ke p an curat reco d of h r dosage ached le and bl eding Wh never bleedi g occ s that is not on hed le (during withdrawal ph se) an inve tigation for tumor should be instituted V ginal cytological xamina tion hould be carri d out outinely eve y 6 mo tha o 1 y ar

2 Psychologi l aspects M y of the symptoms of th meno pa se are ndo btedly psychological The m st ommon symptom is anxi ty mo seve e emotional disord rs may occ r
   a Sedation Phenobarbital U S P Phe obarbitone B P 15 mg (1/4 g) t i d q i d
   b Psy hotherapy Simple planation and reassura c that thei lives ne d not be changed bec e of th m nopause are ad quat in mo t pati nts In the mo e sev re s howe r the id of a psychiat ist m y prov necessary

B S gi al and X ray M ope These cas s diff from th nat ral m opaus only in th abruptness and severity of the symptoms both physiologi al and p ychol gical I these patie ts it is advisable to help th pati nt live as normal a lif as pos ibl If the patients ca be made to have normal periods and if th y und r and that their men trual cycl will go on un ha ged they usually mak suitable adjustm nts E troge therapy i a for natur l menopau e (see above)

Compli t ons of Postm nopausal Hypogonadism and Tr tme t

A Osteoporos (se p 379)
B Senil Vaginiti Give Di thylstilbestrol U S P Stilboe t ol B P 0 1 0 5 mg (1/600 1/120 gr) or other e trogens (p 422) daily o ally Stilbestrol vaginal suppositori s con taini g 1 mg (1/60 gr) may be used daily for 10 to 14 days while continui g oral stilbestrol

MENORRHAGIA (code No 785 x20)
FUNCTIONAL UTERINE BLEEDING

With the gradual failure of ovarian function excessive bleeding at the time of the menses is a common occurrence This has been shown to be due to prolonged hypoestrogenic effect without con comitant progesterone production

Another type of *functional uterine bleeding occurs most common* ly in young women Here a hyperestrogenic effect is responsible In any case of prolonged and unusual bleeding suspect and rule out neoplasms of the uterus

Treatment consists of administration of progesterone 100 mg ($1\frac{1}{2}$ gr) orally or 10 15 mg ($\frac{1}{6}$ $\frac{1}{4}$ gr) I M daily for 5 days This converts the proliferative endometrium into a secretory one with complete shedding when the progesterone is withdrawn

OBESITY (code No 007)
(Due to Excess Food code No 010 70x)
(Undetermined Cause code No 010 70y)

Obesity may be defined as an increase in weight of over 10% above normal due to generalized deposition of fat in the body 'Normal weight is difficult to determine for average clinical practice however normal as defined by the standard age height and weight tables is satisfactory (see table p 572)

From a metabolic poi t of view all obesity has a common cause intake of more calories than are required for energy metabo lism The r asons for differences in the energy tilizations of various individuals whereby that one person can utilize his calor es more efficiently than another is unknown Altho gh mo t cases of obesity are due to simple overeating a few endocrine disorders *lead to specific types of obesity (e g C shing s syndrome and* hypothalamic lesions) but these conditions are rare Hypothyroid ism on the other hand is not necessarily associated with obesity

Tr atment

Specific weight reducing chemical agents and hormones *singly or in combination* are either ineffecti e or hazardous and have no place in the treatment of exogenous obesity

A Diet (see p 56) Diet is the most important factor in the man agem nt of obesity There are a number of points to con ider

1 Calories In order to lose weight it is necessary to decrease the intake to below the caloric requirements of the individual (see p 45) One can determine a very app oximate average weight loss per day with a g ven diet by the following form la

$$\frac{\text{Approximate Caloric Requi em nts Per Day} - \text{N mber of Calories in Di t}}{4000} = \text{Weight Loss in lbs /D y}$$

Th numb r of calories per day to prescribe for a patient varies with age occupation temperament and the urge cy of the need for weight reduction A daily caloric intake of 800 1200 Calories is satisfactory for a reducing diet

Th re is no evidence that supervised rapid weight loss is harmful It has been shown that with adequate protein int ke nitrogen balan e an be maintained on 350 450 Calori p r day In th e ma kedly restricted di ts ketonuria may appear It is usually very slight after th fi t few days how ev a d acidosis has never be n obs rved In addition since the pati nts r alize they a on a diet they oft will adhere mor willi gly wh n they show rapid weight loss than wh n the results s em to be slow in appea i g

2 P ot in A prot in intake of at l ast 1 Gm /Kg (0 45 Gm / lb) should be maintained If it is necessary to dd protein t the low c lo ic diet p otein hyd olysate or cas in that ar fr e of ca bohydrat and fat can be us d
3 CHO and fat To keep th calori s and ket sis down f ts are decreased as much as pos ibl Aft the prot in re quirement have been met most of th remaining d et is pplied from CHO
4 Vitamins and min rals Mo t red cing diet a likely to be d fi i t in vitamins but adequate in minerals Th ref e ny good vitamin preparation should be used to upply th average daily maintenance requirem nts d ring the time of weight red ction
5 Sodium rest i tion It has been shown that a normal person on a salt free d t will lose from 5 6 lb (2 3 Kg) of weight this red tion is temporary and th w ight will re t rn wh n salt i added to th di t Th sam is tru of the bes patie t and although an apparently d amati ff ct can be obtained with salt free diets it is of no permanent value

B M di tion

1 To d reas th appetit Amph tami Sulfate U S P B P ha proved of immens value in aidi g patients on re ducing regim s by d reasing th ppetite nd giving a sens of well bei g In proper doses it is rarely contraindi ated xc pt in c rdiova ula diseases espe ially hypert nsion and in thos pati nt in whom the dr g prod c s C N S tim lation Be a se of its C N S tim lating effect it i be t to a oid ausi g insomnia by not giving the drug i the ev ning Th drug i ually giv twice a day in the morni g and early afternoon or ½ hou before bre kf st 5 10 mg (1/12 1/6 gr) b i d or mphetamine ulf t (Dex edrine®) 2½ 5 mg (1/24 1/12 gr) b i d
2 Drugs t peed up m taboli m There is o satisfa o tory drug to speed up metabolism
a Thyroid Thyroid has little or o pla e in the manage m t f obesity Th low B M R found s ociated with obe ity i m rely an art fa t aus d by the f ct that B M R i m s reme t of oxyge one mption i t rm of body s rf e rea The body s fac are of obes patie t is increased but the increase is d to a relatively poo oxygen onsum nam ly f tty tis ue rather than the o he more active ti ues and hence an pparently low B M R re lts Actually the basal caloric requi m t of an obe e indi idual a great r than they would be if the sam individual w re of normal

2 Liver glycogen stores become depleted in supplying glucose to the body
3 Protein stores begin to break down at an excessive rate to supply glucose (gluconeogenesis)
4 Fat becomes the main source of energy
5 Fat oxidation is very efficient to the point of ketone body formation (β hydroxybutyric acid and acetoacetic acid)
6 The maximum rate of ketone body oxidation by the peripheral tissues is slower than their rate of formation
7 As a res lt of *increased ketone body formation a d their* slow utilization ketone bodies accumulate in the blood and spill over into the urine Since these substances are acid they are excreted in the urine joined to fixed base (Na^+ K^+ Ca^{++} etc) The accumulation of acid ions and loss of fixed base result in the condition known as acidosis

Diagnosis

The typical clinical features in untreated diabetes mellitus are polydipsia polyphagia polyuria and weight loss but these occur only in the more severe forms of the disease Because of the varied and nonspecific symptomatology of th disease the actual diagnosis of diabetes rests upon laboratory evidence It should be emphasized that all laboratory tests for diabetes are nonspecific and abnormalities of one or all may occur in other diseases (e g hyperthyroidism liver disease) However in the absence of other diseases glycosuria and hyperglycemia are diagnostic

A Glycosuria *The presence of reducing substances identified as* glucose in the urine is excellent presumptive evidence
B Hyperglycemia The finding of an elevated fasting blood sugar and/or abnormal blood sugar level 2 hours after a meal containing 100 grams of carbohydrate or a dose of 100 grams of glucose is almost diagnostic in the absence of other diseases This test should be performed however only after the patient has been on a high carbohydrate diet for at least 48 hours It is well known that the previous diet influences carbohydrate tolerance A high fat diet will decrease tolerance (i e give diabetic type curve even in normals) and a high carbohydrate *diet will in rease tolerance*
C I terpretation of Blood Suga Tests A normal fasting blood sugar does not rul out diabetes If the 2 hour postprandial blood sugar level is over 140 one can be reasonably certain that the condition s diabetes If the blood sugar level is between 90 and 140 it is necessary to perform a glucose tolerance test to est blish the diagnosis

TREATMENT OF DIABETES MELLITUS

In order to treat patients with diabetes it is necessary that one be thoroughly familiar with the following
1 Insulin (probably of greatest importance)
2 Diet
3 Infl ence of exercise
4 Prompt treatment of complications etc

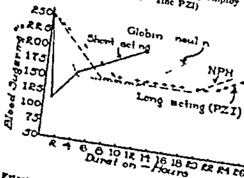
Insulin is utili ed clinic lly to enhan e arbohydrat oxidation This is m sur d clinl lly by noting th lowering of the blood sugar o the lessening or disappearance of glycosuria

A Duratio of A tion d Ins lin P parati There are 3 main type of ins lin ilabl

1 Short acting insulin Insulin Inj ction U S P B P
   R gular insulin
   b Crystalline zin insulin
   (Fo clinical purposes the actions of these 2 insulins are identical Cry talline zinc insulin is pref rred only beca se of its g eater purity) Th se are us f l mainly in cont lling postpra dial blood sugar elevations

2 Long acti g insulin Protamine Zinc Insulin Inj ction U S P B P This is usef l fo l wering th milder hyperglycemia which is prese t d ri g th remainder of th tim between m ls

3 Intermediate cting insulin
   a Isophane in ulin NNR (NPH) A stabl 'mixture with properties much like a 2 1 mixture and has t nded to re pla e PZI in the management of mo t diabetic pati nts It may al o be 'tailo ed t f t th pati nt by addition of appropriate amounts of regular in ulin
   b Globin insulin with Zinc U S P This insulin is imilar in action to 2 1 ins lin mixtu e exc pt that its d ration of ff t i not a prolonged It is us ful in m ny diabetic patients b t it cannot be mi d with short acting ins lin
   c F clini al use interm diat insul n may be prepared by mixing a short acti g a d a long a ting i sulin in a si gl sy i g By th use of thes mixt es one obtains a bal e betw en th immediat ff t and the prolonged effect by modifyi g the mixt res on can dva tageou ly 'tailo th ins lin req irements to the individual needs of th pati nt The mixt res usually employ d lin c lly are 2 1 o 3 1 (rystalli zinc PZI)



Extent and Duration of Action of Various Insulins (in a Fasting Diabetic)

(1) Points to remember in use of insulin mixtures
- (a) Regular insulin must always be with drawn into syringe before withdrawing PZI (because of pro tamine excess in PZI)
- (b) Same unitage of regular insulin and PZI must be used
- (c) General effect of I/PZI mi lures
  - 1 1 largely PZI effect (little point to this mixture)
  - 2 1 intermediate daytime nitetime eff ct
  - 3 1 greater daytime effect

(2) Application of tailored insulin mixtures
- (a) If glycosuria occurs in all fractional urines in crease total insulin mixtures
- (b) If glycosuria occurs in fractional urines 1 and 2 only (daytime glycosuria) increase regular insulin in mixture
- (c) If glycosuria occurs in fractional urines 3 and 4 only (nitetime glycosuria) increase PZI in mixture

B Commercial insulin pr parations come in various strengths (units/cc) in 5 nd 10 cc ampules identified as follows

Potency Preparation	Color of R bber Stopper	Color of Label
U20 Unmodifi d regular	Yellow	Yellow
U20 Crystalline	Yellow	Gray and bl e or blue gray and yellow
U20 PZI	Not Available	
U40 Unmodified regular	Red	Red
U40 Crystallin	R d	Red and gray
U40 I ZI	Red	White label with red printing
U40 NPH	Red	Bl e and white
U40 Gl bin Zi c	R d	Red and brown
U80 Unmodified regular	Green	Green
U80 Cryst ll ne	G een	(reen and gray
U80 PZI	Green	White label with green printing
U80 NPH	Gre n	Blue and white
U80 Globin Zinc	Green	G e n and brown
U100 Unmodified regular	Orange	Orange

C Admi istration of Insulin,

1 Selection of insulin preparation In view of the large num ber of insulin p eparations available there is often gr at confusion regarding dosage Therefore it is necessary to place the patient on one type of insulin and have him become familiar with this type One uses an insulin of such strength that the volume per injection is kept at 0 25 to 0 5 cc About 80% of patients are able to use U40 insulins

2. Syringes In order to aid patient syringes are vailable allbrated in units (U) rather than cubic centimeters Many of th se syri ges have 2 alibrations (U20 U40 o U40 U80) and it is important to ha e the pati nt thoroughly understand which sc l he is using It is advisable however to em ploy a syri ge having one calibration only Spe ial syringes are available fo blind diabetic pati nts
3. Sites of injection Insulin is usually administered s bcutane ously The site of inj ction is generally the ant rior thigh but insulin may also be giv n in the lateral thigh in the arms or ant rior abdomen or in unusual circumstan es sub c taneously in anothe part of the body It is important that the sit s be onstantly hanged so that the same site is not i jected mo e often than onc e ry 2 3 w ks Cryst llin and regular insulin may be administered I V to patients who have been taking insulin with ut allergic reaction *Do not give PZI or NPH intravenously*

Di t in Diabeti s

The n tritional needs of th di betic patie t a e not significantly diff rent from tho e of normal individuals The principal qu stion to be settl d is the qua tity and type of carbohydrat to be allow d in the di t (Fo detail d food harts in making up diets s e pp 44 51 and for examples of diabeti di ts see p 55)

N t Whenev r possible diabetic diets should be made up in t rms of hou ehold m as rements rather than weight f r clini ally the extra accuracy gained by weighing is gen rally unne ess y

The following factors m t be tak n into consid ration in esti mating the diet

A. Cal i Ne ds (See p 45) The c loric n ed of the d abetic are timat d as for a non-diabetic individual and the same vari bl s m st be considered In general one should remem ber that th diabetic pati nt should be k pt at normal or slightly subnorm l w ight levels and nev r pe mitted to become obese
B. Prot in Prot in must be adequate and high prot in diets re d irable bec us the available glucose (58%) from protein is rel ased more slowly for utilization than ingest d c rbohydrate At l ast 1 Gm of protein per Kg (0 45 Gm /lb) of body weight should be given although 1½ 2 Gm /Kg (0 7 0 9 Gm /lb) are pref rabl
C. C boh drat Carbohydrate should not be given in concentra ted f m Preferenc should be given to 5% and 10% fruits nd vegetabl thes tak longer to dige t and adso b and a less v riabl blood s gar level i obt ined The question of ade quate versus re tricted carbohydrat in the di t is still uns t tled In general the vi w i tak n that in the diabetic the aim i to keep the indi idual as close to physiologi al normal as possibl and hence to keep his c rbohydrate at approximat ly normal levels and to administ r in ulin if n ces ry to con trol a y resulting hyperg yc mia and glycosuria In general therefore 2 3 Gm of c rbohydrate per Kg (0 9 1 4 Gm /lb) of body w ight i recomm nded at the start of tre tm t if patient s tol ranc increas s with treatment gradually in crease carbohydrate to 4 Gm per Kg (1 8 Gm /lb) of body weight This is a general rule and in some mild diabeti s it

may be advisable to keep the carbohydrate level down to avoid the use of insulin However both for physiological and for psychological reasons the carbohydrate level should in no case be below 100 Gm per day

D <u>Fat</u>. After the carbohydrate and protein amounts have been determined fat is given to make up the remaining caloric re quirements

E <u>Vitamins</u> Patients with diabetes tend to develop vitamin de ficiencies especially of the B complex The reasons are not always clear but may be due to inadequate food intake restric ted diets or increased requirements or improper utilization of vitamins Deficiencies on adequate diets are rare if they occur treat as needed (see p 58)

F <u>Frequency of Feeding</u> Diabetics should be given small frequent feedings rather than large meals By frequent feedings the use of high protein intake and less concentrated carbohydrate foods one can maintain a lower and more even blood sugar level with less glycosuria An excellent plan is to divide the feedings into six meals three regular meals and three small feedings (e g milk) at mid morning mid afternoon and bed time

<u>Othe Facto s Infl en ing Diabet s</u>

A <u>Exercise</u>. Exercise enhances the oxidation of sugar hence it diminishes the need for insulin Therefore exercise in moder ation is beneficial However patients taking insulin should be cautioned against strenuous exercise without fortifying them selves previously with ext a carbohydrate (It is not uncom mon to have a hypoglycemic reaction after a set of tennis) Wh en regulating a patient have him perform approximately the same amount of exercise as will be required by his normal activities This is true also of hospital regulated diabetics

B <u>Complicating Fa to s</u> A large number of factors ad ersely affect the course of the patient w th diabetes All of these con ditions operate by altering the absorption of glucose by inter fering with carbohydrate oxidation or by causing excessive carbohydrate formation The most important of these factors are infections especially those of pyogenic nature with fever and toxemia Any infection is serious in a diabetic for it completely upsets the eq ilibrium established by therapy al ways inc eases the need for insulin and is one of the most common precipitating causes of ketosis and acidosis There fore any and all infections in the diabetic are to be avoided wh never possible when they occur they must be treated promptly and vigorously During severe infections it is gener ally advisable to discontin e PZI and to begin therapy in divided doses 6 t mes daily with regular or crystalline insulin as needed to cover postprandial glycosuria

C <u>G e al Factors</u>. Patients with diabetes should live as nearly normal hyg nic lives as possible They should be assured of adequat rest should be able to eat at home if at all possible and should engage in an occupation requiring at least moderate exercise but must avoid strenuous occupations of greatest im portance they should have a good general knowledge of diabetes

STEPS IN THE MANAGEMENT OF THE DIABETIC PATIENT

There a e m ny adequate methods f r managing diabetics Th followi g is a pla us d by th a thors whi h is felt to b practical and physiologic lly so nd

T P A – D OSTIC CRF-UP

1. Complet history d physic l examination f r diagnosis and t ule o t the prese of any coexisting or complicating dis se
2. Urinaly is for qualitati e ugar on a morning fa ting rine specim n d on specimens coll cted 2 3 hour afte each m al If sugar is p esent check f r ac tone and diaceti a id
3. Blood s g r xamination Fast g and 2 hour po tpr ndial le el are d termined or if n ces ary a glu s tol rance te t perform d In elderly patients or in the p ese ce of nal di ase it is advis b e to pe fo m a glucose t leran e test with simulta eous urine gars to det rmine the pp ox imate renal threshold If this is ve y high (ove 160 180 mg %) it may be n essary to use blood s gar le ls as a che k on ad qu cy of th rapy rath r tha the glycos ria

B – CALCU ATI N D ARA OF DIET

(see p 55 for examples of di betic diets)

1. Determi the c l i n ed of the patie t This is the same s f th non diabetic (see p 45)
2. Calculate th p ot in CHO and f t ont t of the di t s outlin d in th diabetic di t ction on pp 47 50
3. Di id the di t into the followi g
   a. Th ee m dium i ed me ls It is dvisable t pace the m ls s f part as possibl (i e a ea ly breakf st and lat d nne) This will spr d the b orption of gl cos over l ger p iod of th day
   b. Th small f edi gs to be tak n betw m ls and at bedtime Milk a d low CHO fruits are pref red for thi

C

1. Det rmination of amount of glyc u ia Have pati nt eat his diabetic di t fo 1 d y pref rably without ha ge i activity F the t 24 ho rs he is to coll t and lab l fractional u in as f l ws (Pati nt voids just before br akf t d di ards u in spe im n)
   a. Urine N 1 All uri e ided from bre kf t to ju t before lunch This is pooled and a few drops t ken fo qualitati e sugar The rem ind r is ved
   b. Urine No 2 All u ine from lunch to j st before dinner Pool and sa s above
   c. Urine No 3 All urine from din to j st befo e retiring Pool and sa e as ove
   d. Urine No 4 All u in from retiring to ju t befor break f st Pool and sav as above

   Th f w drops of each ind idual u i e f a t on are analyz d qualitati ly f r s ga nd the rem i de pooled f r the daily total qua itati e s gar

2 Calculation of approximate insulin requirements *from quantitative urine sugar determinations* Since *roughly 1* unit of insulin will cover 2 Gm of glucose the insulin needs in the uncomplicated diabetic can be calculated as follows

$$\frac{\text{Gm of Glucose in 24 hour Urine Specimen}}{2} = \textit{Approximate No of Units of Insulin Needed per 24 Hours}$$

The insulin (24 hour requirement) is generally given as NPH or as a mixture in a single dose 1/2 hour before breakfast The usual mixtures are 2 1 or 3 1 (crystalline zinc PZI) or NPH regular mixtures

a In severe or complicated diabetes because the patient needs insulin immediately these measures cannot be performed (see p 403)

b High renal threshold In certain elderly patients or those with renal disease who have a high renal threshold for sugar this method will be without value These patients must be controlled by the determination of the blood sugar levels while fasting and 1 hour *after meals In these* cases begin with small doses of long acting insulin (5 10 units/day) and increase as indicated by tests

3 Adjustment of insulin dosage and mixture The patient continues to collect his urine fractions as outlin d above and the dosage and composition of the insulin mixture is determined each morning after completing the qualitative sugar analysis for the previous day Quantitative sugars are usually not necessary after the first day The amount and time of glycosuria on the preceding day determines the re adjustment to be made The glycosuria at any time must be kept at a minimum (no greater than green reduction in any specimen) In general especially with longer a ting insulins changes should not be made freq ently simply be cause occasionally marked insulin reactions occur

a If all specimens are green no adjustment of dosage or composition of insulin is necessary

b If glycosuria (greater than green reduction) occurs after *breakfast or after the noon meal the regular insulin is* increased

c If glycosuria (greater than green reduction) occurs in the afternoon after the evening meal or before breakfast the protamine zinc insulin is increased

d If glycosuria (greater than green reduction) occurs in all specimens both regular and protamine zi c insulins are increased

e Amount of increase of insulin will vary with each patient Generally a very rough guide for the increase of insulin is as follows

(1) Yellow reduction Add up to 5 units
(2) Ora ge red ction Add 5 10 units
(3) Brick red reduction Add 10 15 units

f If there is no gly osuria (specimen remains blue) the patient should be question d for evidence of hypoglycemia and each urin voided should be examined Adjustment of dosage must be made in accordance with th findings

4 Readjustment of the size of feedings If ariations of the in lin dosage a d composition do not maintain the glycosuria at a minimum for a giv n period the dietary intake for the preceding meal should be decreased and the intake for other m als incre sed a like amount

STEP D – FOLLOW-UP OF PATIENT

After patient has be n adequately controll d he should be seen at regular intervals arranged as need d to check fo any cha ge in th patient or in his diabetic status

1 Hypoglycemi reactions Carefully question patient as to occ rren e of a y hypoglycemic r acti ns If th se occu lower i sulin accordi g to time of day th y take place
2 Examine patie t s urine If all rine is e tirely free of sugar the pati t is controlled (if r nal threshold normal) be car f l of hypoglycemic reactions howev r if all urines are bl early in therapy for patient s tol rance will im p o e under therapy The e is no contr indic tion to ha ing some green r d ctions (On the contr ry there is some evide ce that moderate glycosuria per s is not ha mful if the metabolic needs of the body are being f lfill d H w ver it is usually best to keep ad q te control ov r pati ts o they t nd to ignore th ir di ease e tirely) If there is marked glyco ia in ny urine the ins lin is adjust d ac ordingly
3 W igh pati t Follow pati nt s weight to be sure that the weight is incre sing d creasing o remaining stati nary as desired If not alt r the di t ccordingly
4 Draw blood fo f sting blood sugar level to determine wh ther fasti g hyperglyc mia is being ad quately controlled (This n ed not be done on every isit in fa t it can be done quit infrequently once the patient is standardi ed)

COMPLICATIONS OF INSULIN THERAPY

HYPOGLYCEMIA (code No 574)

Hypoglycemi is th most common compli ation of insulin therapy and sually occu s wh n the diabeti f ils to e t o e gets in too tre uous rci e It is manifested by weakn s hunger irritability f intness and trem rs and onvulsions ll of which are r li d promptly by the administration of g cos If a di betic pati t is e n unconsciou and if diagnosis of coma or i s in re action is impossibl or in doubt give 50% gl cose I V This will d finit ly overcom the i s n r a tion and will not gener lly harm th patie t in diabetic a idosis

Fresh text

A [illegible] Dec se of the da ger of insul react on the dia be i pat t should c y s veral l mps of sugar o g ucose lose gra i ll time s If he feels the onset of a re ction he hou d tak some s gar
B [illegible] Card Every d betic should arry a ard with the followi g information

I AM A DIABETIC AND TAKE INSULIN

If I am behaving peculiarly give me sugar or hard candy or orange juice slowly If I am unconscious call an ambulance immediately take me to a physician or a hos pital and notify my physician *I am not intoxicated*

My Name is________________________

Address________________ Telephone________

Physician s Name________________________

Physician s Address______________ Telephone________

Treatment

A Mild Hypoglycemia If patient is conscious and able to swallow sugar glucose or orange juice may be given

B Moderate to Severe Hypoglycemia *Do not attempt to feed patient if unconscious* If patient is unconscious one of three methods may be used

1 I V glucose (treatment of choice) 20 50 cc (5 12 dr) of 50% glucose I V slowly As soon as consciousness is re stored oral feedings may begin

2 Epinephrin adrenaline If patient is well nourished especially if using short acting insulin and liver is not de pleted of glycogen epinephrine 0 5 1 0 cc (8 15m)of 1 1000 solution subcut may cause return of consciousness so that food may be taken by mouth

3 *Rectal feeding If patient is unconscious and I V glucose is* not available (and if epinephrine is either not available or not feasible or successful) glucose by rectum may be life saving Add 2 Tbsp of syrup or honey to a pint of warm water and give slowly by rectum

C Pr ve tion of Relapse When patients taking protamine zinc insulin develop reactions they should be carefully watched for *danger of relapse High protein food such as milk should be* given in addition to carbohydrate

OTHER COMPLICATIONS OF INSULIN THERAPY

Allergic Reaction

Fortunately allergic reactions are very rare and most re actions are localized These individuals are gen rally sensitive to pork pancreas from which about 60% of commercial insulin is made (other 40% from beef) Th se patients should be giv n pure beef insulin preparation (Special Insulin) which is put up in 10 cc ampules of U40 If patient is still sensitive desensitization measures should be tri d (see p 113)

Lipoatrophy

This rare complication consists of atrophy of subcuta e us fat at the sites of injection This may b caused by improp r rotati n of injection sites but some cases occur in spite of *careful th rapy*

Th s patient should use U80 or U100 insulin otate inj ction sit s and make injection at body are s which are lothed t all tim s

COMPLICATIONS OF DIABETES

CHRONIC COMPLICATIONS

There are certain di ase proc as s that t nd to occ r with greater fr que cy in diabetic pati nts than in on di betics a d a f w conditions that are rath typic lly associat d with di bet s Th y are m tion d here in ord to call atte tion to them Thei therapy is ge rally that of ad quate control of the diabetes and the apy of the oexisting or unde lyi g dise e The mo t common dise ses are

A A t ios l sis Especially of the periph ral art ries of the l g For therapy see p 208
B Di betic P ipheral Neuritis (Se p 358)
C Di beti Oc la C mpl io Incl de cataract which is tre t d a rgi ally nd r tinitis for which no form of therapy is of any avail
D Re l Compli ation I tercapill ry glom rulos l rosis char a t ized by hype t nsion albuminuri and edema Treat as f glomerulon ph itis (s p 293)

ACUTE COMPLICATIONS OF DIABETES

When the amount of insulin in the body is inadequate f m ta boli needs abnormal metabolism res lts with ketone body f rm tion and finally with acidosis Infection whi h ca es a increased d mand for ins lin usually precipitates k tosis There is an a ly mild phase and a late or severe one

A Di beti K tosis Without Acid sis. CO_2 combining power is orm l lightly dep e ed (bove 50 60 Vol % or 27 mEq)
B Diabe i Acid sis. R d ction of CO_2 combining powe (below 50 Vol % or 27 mEq) The patient may be ons iou pre comatose or comatos

DIABETIC KETOSIS (Without Acidosis) (code No 543)

In thi disorder k tone bodi s re found in the urine and thei presenc t bli hes th diagnosis Ex mine the pat t f inf c tion or othe pre ipitati g f t r Th fluid and el ctrolyt balance re undi turbed

Tre tm t

Pat nt should be hospitalized for regulation if ketosis is severe

A Treat a y infect on whi h m y ggravat the d sord red metabo lism
B Di t Arrange di t to contain 3 equal f d gs with interval feedings between each meal and in th evening

C Insulin
1 If ketosis is very severe use *only short-acting insulins* Give insulin to cover each meal as necessary until the urine is free from ketone bodies Then begin reducing insulin dosage slowly as tolerance to carbohydrate improves
2 If ketosis is not severe treat and regulate as uncomplicated diabetes

D Follow up When ketonuria has cleared patient is managed as for uncomplicated diabetes according to the severity of his disease (see p 399)

DIABETIC ACIDOSIS (Diabetic Coma) (code No 542)

When ketone formation is proceeding at a rapid rate the fluid and electrolyte balance and pH of the body are upset (see below) The ketone bodies are organic acids which replace the HCO_3 in the body and also are excreted from the body combined with fixed base This loss of fixed base and the disturbance of the buffering systems leads to acidosis The increase in the glucose in the blood produces diuresis of needed body fluids

Diagnosis

Diabetic acidosis is manifested by headache irritability drowsiness hyperpnea and fever Nausea vomiting diarrhea and abdominal pain may also be present The sweetish fruity' acetone breath may be detected On physical examination the skin and mucous membranes are usually dry blood pressure low eyeballs soft and pulse usually rapid and thready

Principles of Therapy

For emergency management see below

The principles of therapy whether the patient is precomatose or *or in coma* are the same *It is imperative that a patient in acidosis* be hospitalized and treated as a medical emergency Each case must be individualized

A Insulin in large amounts is necessary to bring about a return to normal metabolism *Use short-acting insulin never treat patients in coma with PZI* The first dose of insulin should be 100 200 units one half should be given I V and the other half subcutaneously *Insulin may also be added to I V* fluids being administered Because of the mode of action of insulin (see p 393) there is no need to repeat sooner than in 1 2 hours The dose may then be repeated subcut or I V giving 50 75 units every 1 2 hours as needed until the ketonuria begins to disappear If shock is present the insulin should be given I V because of the unreliable absorption during shock of material given subcutaneously

B Glucos.. In diabetic acidosis one is treating the ketosis and acidosis and not the hyperglycemia and glycosuria *Although* the patient with acidosis may have a high blood sugar level the total available carbohydrate stores may actually be v ry low Therefore since it is necessary to have an adequate *glucose* supply upon which insulin can act in overcoming acidosis these

patients should be gi en glucose when the blood sugar level has begun to fall rapidly It has been shown that k tosis can be re duced by giving very large amounts of gl cose to diabetic patients who are deprived of insulin The ooner the normal m tabolic pathways ar reestablished the sooner e cess fat oxidation ceases and ketonemia is overcome In addition it is possible to precipitate hypogly emic reaction in a patient with low sugar re erves before the ketosis is brought und r control

C <u>Fructo e o Inv rt Suga</u> It has been shown that after I V inf sions fructose dis pp ars from the blood stream of diabetics as rapidly as it does from normals It has been suggested therefo e that this s gar be substituted for glucose in the treat me t of diabetics be ause it is utiliz d in the absence of insulin Howev there is some evidenc to show that in spite of its utilization in the diabetic it has no anti ket geni effect without insulin Until this criti al qu stion is tl d one should conti ue to us glu ose and insulin in th manage ment of diabetic acidosis

D <u>Fluids d Fl ctrolyt s</u>

1 Fluids must be gi en to replace those lost by di re is and vomiting These are usually best given I V
2 Adequate sodium chlorid is very important This repla es fixed bas in the extracellular fluid and so h lps in ove coming the acidosis As a re ult of k tosis the lo of sodium chloride from th body may be as great as 30 Gm (50% of average total body sodium) in 24 48 hours In the mild c se sodium chl ride needs to be replaced and sodi um chloride lution with glucose is usually adequate fluid the apy
3 Replacem t of bicarbonat buffe As the k tone bodies are e cr ted o oxidi d CO_2 is formed which rep a s the disappearing k tones nd th CO_2 combining powe returns to normal However in patients with severe uncompli ated metabolic acidosis it may be advisabl to administer more rapidly available HCO_3^- and fixed base (I e N^+) This may be given I V as sodium bicarbonat or M/6 sodium lactat
4 Potassi m replac ment As sodium i administered (as sodi m chlo id sodium bicarbonat o sodium lactate) and glucose is m tabolized and stored the potas ium which has ent red the extra ellular fluid migrat s rapidly intra c llularly or is wa hed out with the fluid th ough the kidneys Whe this oc urs there may be a temporary and dangerous xtracellula potas i m defi i ncy with weakness respi at ry distres and at tim s ardia arre t Solutions containing potas ium must be given to orre t thi and generally when I V glucose become indicated potassium may be added t the infusion mi ture (e p 25) It must be us d with xtreme tion in th ab ence of adequat urinary output The level may roughly be che ked with the E g (p 18).

<u>Trea t</u>

A <u>Em rgency M re</u> The following is an outline of therapy that m y be mployed in the average pat nt in diabet c coma

however each case must be individualized and therapy modified as necessary according to the needs of the patient

1 *Hospitalize patient* *Keep patient warm* avoid excessive warmth Avoid the use of barbiturates and narcotics
2 If in *SHOCK* treat with I V plasma and other shock measures especially vasopressors (see p 31)
3 Blood chemistry Draw blood for CO_2 combining power and blood sugar also for sodium potassium and chloride if these tests can be performed
4 Give insulin at once
   a Through same needle used for drawing blood give 50 100 units of *regular or crystalline insulin* I V immediately as well as a like amount subcutaneously
   b Repeat insulin giving 50 75 units subcut every 1 2 hours until there is rapid diminution in blood *or urinary sugar*
5 Catheterize patient An indwelling catheter may be left in place allow this to drain continuously Examine spot (periodic) urine specimen every hour for ketone bodies and sugar
6 Fluids electrolytes and glucose
   a Begin I V infusion of saline May also begin clysis of saline M/6 sodium lactate or other indicated solutions at same time (see p 21) As soon as urinary sugar has changed to olive or green reduction change I V fluids to 5% glucose in saline to which is added 1/2 1 unit of insulin per gram of sugar (25 50 units insulin per liter) and 20 mEq potassium and possibly phosphate The urine should contain sugar at all times to avoid hypoglycemic reactions
   b As soon as reports come from laboratory if CO_2 combining power is below 5 mEq /liter (10 Vol %) calculate amount of sodium lactate or sodium bicarbonate desired (see p 21) and administer immediately (To administer sodium bicarbonate I V merely dissolve chemically pure sodium bicarbonate in 200 300 cc cool distilled water and administer *Do not heat or sterilize the solution*)
   c Gastric lavage may be performed w th introd ction of 200 cc of physiological saline or 5% $NaHCO_3$
   d *As long* as patient is unconscious administer 5% glu ose in saline or other salt solution as indicated (about 60 d ops per minute) See p 405
   e As soon as patient is conscio s and able to swallow give fruit j ice (200 cc orange juice with 1 tablespoon honey syrup or glucose) every 3 4 hou s until keto uria has stopped Stop I V gl cose and fluids

B <u>Follow up</u>

1 Potassium deficiency After 4 to 8 hou s of administration of I V fluids watch patient carefully for potassium d ficiency (i e weakness r spi atory dist ess) and check the Ecg (see p 19) Give solutions containing pota sium (see p 25) as indicated It may be advisable to begin administration of potassium as soon as *th c ma t e tment is* begun but this is still not settled When patient is able to swallow give supplementary potassium s lts by mouth as this is the safest route

2 Oral fe di gs and fl id If keto uria is di appearing or is rapidly imp ovi g (ually in 24 48 hours) and the pati nt i conscious the following may be giv n
   a Small frequent f edings of liquid and semi liquid foods ontaini g 50 75 Gm gl cose and protein (s milk) every 3 4 hours day and night and cover with 25 35 units regular insulin very 4 hou s
   b Fo ce fluids by mo th
   Examin urine fo ugar a d k tone bodies ev ry 3-4 H s
3 Regular diet Afte 24-48 hou s if pati nt shows st ady improvem t plac on gula di beti diet and begin regul tio as o tlin d on p 399

DIABETES ASSOCIATED WITH OTHER CONDITIONS

PREGNANCY

The ma gement of the p gnant diabetic is little different from that of any other diabetic

A Duri g th early period of pregnancy there is often a lowering of the renal thresh ld and onsid able lability of the blood s gar le el
B Du ing th latter three months there is often a ma ked d re i gl os tole nc ne ssit ti g increased insuli dosage Thi i ot niver al howeve and ma y go th ough pregnancy without signifi a t changes in tole nce
C Before the on t of lab and d li ry it is advisabl to hange to short acting insulins t avoid possibl reaction from lack of food
D In iew of wo k suggesting sex hormonal imbalanc s in pregnant diabeti s therapy with e trog n or progest one o both has been advoc ted as being of val e in dimini hi g fetal m rtality However refully ontrolled studi s usi g mode di beti treatm t m thods show as good or better re ults without reso ti g to this expensi e and troublesom proced re
E S nce many diabetic pregnancie go beyond expe ted term or the inf nts are unusually la ge it has bee gge ted by m y that pregnancy be terminat d at abo t 36 week The prefe red m thod appears to be es rea s ction

The C re of the Inf nt

T at ll inf nt of diabetic mothe s as premat re Keep Infa t in incubato unde oxygen f fir t seve al days Observe the newly bo n infant arefully for the first 72 hours f hypo- glyc mi rea tions that may occur s pposedly s a result of isl t c ll hyperplasi Thi is more apt to occur in the newborn of poorly control d diabetics

SURGERY

Surgery in the diabetic at present presents little hazard over that of the surgical procedure per se However there are certain problems peculiar to the diabetic and these problems naturally vary with the severity of the disease and the urgency of surgery

Emergency Surgery

A Fo Non Tra matic Conditions Usually diabetics requiring emergency surgery for non traumatic disorders are in ketosis with or without acidosis and require immediate treatment of their diabetes These patients should be treated as patients with acidosis or coma (the latter if a general anesthesia is to be used) The general program should be as follows

1 Draw blood for CO_2 combining power and blood sugar also for electrolyte panel (sodium potassium chlo ide) if possible
2 *Begin 5% glucose in saline infusion I V slowly (not over 70 drops per minute) and continue infusion throughout surgical procedure* One unit of insu *lin per 2 Gm glucose may be added to the infusion (25 units* for each 1000 cc of 5% glucose)
3 *Give 50 units short acting insulin I V if ketosis is present*
4 After returning from surgery continue therapy as for dia *betic coma (see p 404) until oral feeding can begin and* ketosis and hyperglycemia are controlled

B *For Trauma Although increased carbohydrate tolerance de* velops rapidly as a result of trauma the principle danger in a treated diabetic who is injured is the possibility of having a severe hypoglycemic reaction because he fails to eat There fore if the patient is conscious give sweetened orange juice or candy by mouth if surgery is necessary give 5% gl cose I V in water or saline slowly One may add 1 unit insulin per 2 3 Gm glucose to the infusion however the need is not so much for insulin as for glucose to avoid hypoglycemia When surgery has been completed treat according to severity of disease (see p 394)

Elective Surgery

A Initial Hosp t l Measures

1 Patient should enter hospital several days before surgery
2 Discontinue protamine zinc insulin
3 The diabetes should be brought under optimum control with regular or crystalline ins lin
4 There should be no ketosis

B During and Aft r *Surgery*

1 No food or insulin should be administered on the mo ning of *surgery*
2 Management during surgery
   a *If the patient s diabetes is* mild and has been properly controlled if he does not tend to develop ketosis and if *the surgery* is not too extensive he may be operated on without food or insulin
   b If the patient s diabetes is moderate or severe or if ex tensive surgery must be performed begin inf sion of 5%

gluco e in line or wat r to which has been added 1 unit regular or crystalline insulin pe 2 Gm gl co Con tin e inf sion throughout urgical proced e Give infu sio at abo t 60 70 drops per min te

3 After s g ry patie t should hav small frequent feedi gs (50 75 Gm c bohyd ate) very 3 4 ho rs covered with 15 25 units f crystalline insulin subcutan ously befo e th meal Th se small f edi gs are co tin ed u til normal n trit on c n be r stablished
4 If gast ointestinal s rgery has been performed and patie t can ot take food by mo th nutrition can best be maintai d by pare t al methods gi e 1000 cc 5% gl cos in 5% mino acid ol tion I V sl wly ov r a period of 4 hours This should be cove ed with 15 40 units of crystallin ins lin bc t before beginning infusion Three lit s per d y is an averag requir ment This the apy may be ontin ed u til o al nutrition can be res m d

HYPERINSULINISM
(Adenoma code No 871 8044A)
(Without Tumor code No 871 784)

Hyperins lini m is caus d by a exc ssi e p oducti of insulin a d manif st d by attacks of weakness hu ger irritability fai t n s nd tremo s and convul ions all of which usually oc on an mpty stomach long afte m als d a reli ved promptly by the admini t tion of glucose Hypoglycemia ot d d ing episodes u ually is below 50 mg % A gluco t i ance c rve d op to e e dingly low levels oft only after 5 6 hours is haract istic Hypogly emia of hepat ervous or oth docr gl d origi m st be on id d i establi hi g the diagnos s

I. tm t

A Em gency T tm t As f hypoglycemic reaction from insuli ov dosage (s p 402)
B Ge ral M
1 Cort ot pin (ACTH) Th administ tion of ACTH (f its hyperglycemic eff ct) has be n hown to be of considerabl benefit in the m nagement of som children suff i g from thi ondition Some children without ade om ta have be uc f lly mai tai ed o tre t d i t rmittently with this d g
2 Di t High prot i high c l i high fat low-carbo hyd at
a The d. t i l w in c rbohydrat s in order to avoid stim lation of the pan re s to elaborate insulin Rapidly tilized s bohydrat ar r placed by s ow acti g ones (g 5 10% v get bles and f uits and bana as and pples) Prot in is impo t nt source of s owly l erated carbohydrate hi h pparently has les stim lati g ffect on the pa cre s and is us ful to s pply dded ri s
b Small f ed gs The d. t i best d vided into s x or more m l a day It may be ne e sary to feed the patient at

regular intervals throughout the entire 24 hours If the hypoglycemia is as severe as this it is advisable not to prolong medical therapy but to prepare the patient properly for surgery

3. Sedation Phenobarbital phenobarbitone 15 30 mg (1/4 1/2 gr) q i d may be valuable in reducing neuromuscular irritability
4. Restriction of physical activity Exercise increases utilization of glucose thereby exaggerating the effect of excess insulin If exercise is unavoidable such activity should be preceded by supplementary carbohydrates
5. Identification card Patient should carry a bracelet or card similar to that used by a diabetic (see p 40)
6. Emergency CHO Patient should be required to carry a small supply of rapidly available carbohydrate (candy lumps of sugar) at all times He is to avoid taking these except when definitely indicated

C. Surgery Complete excision of hyperplastic or adenomatous islet tissue when this is found to be the cause

Chapter 15

HORMONES AND HORMONE LIKE AGENTS

PITUITARY AND PITUITARY LIKE HORMONES

Th pit itary consists of tw p t
A Po t p t on wh h P t of th C N S
B A t ri p rtion which is d void of direct n al inn rvation
C rtain pit ita y like h rmon s that influ nce the gonads ar labor t d by th pl c ta during pr gn y

ANTERIOR PITUITARY HORMONES

All of th anterior pituitary hormones are p ot in subatan e nd must ther f be dminister d pa nt rally t be f cti e if tak n by mo th th y a e digest d by th d gesti e enzym s In gene al with the ption of the g owth and lactogenic hormon s wh e ff t are not mediat d d r ctly thro gh oth r glands th anterio pit itary hormone appe r to ha e a regulatory f n tion on the other glands of i t rnal e retion

In the l st f w yea s ral of thes ho mon have be n p d in p form Those that ha e be n pr p ed in pure lmost pure f rm to d t e the g owth ad nocorticotropic (ACTH) l ctog t thy oid stimulating (TSH), f llicl tim l ting (FSH) and int titial ell timul ting (l t ini ing) ho mon Ther m y be oth fact r in the ant i p t it ry but th y hav not yet be n f lly id tifi d Of the pu e p ep ations only ACTH and thyrot p at pre nt comm cially availabl

Corti ot ri (ACTH)

Co ci h been shown to have r m kabl ff ct in ar ting many d s proc s whi h are not s ti f ctorily in fluenc d by othe the apeuti gent It ffect is tirely med at d by th stim l tion f the adrenal cort Cortico t opin i a prot in of m ll molecu r i e and peptides de ived f om it have be n found t have imilar and ma k d physiologi al ff cts a the horm ne it lf

A M t f in h m ACTH i a equate dos to nor mal human being p oduc th f llowi g met boli eff ct

1 Inc a d x retion of nitrogen pot ium a d phos horus an eur e
2 Ret tion of odi m and com tary et ntion of w t
3 El vation of fasting b ood s g r and diabetic g ucco to
4 Incre d t on of uri id

5 Increased urinary 17 ketosteroids and 11 oxysteroids
6 *Fall* in circulating eosinophils and lymphocytes and elevation of polymorphonuclears

B For clinical effects uses and dosages see page 423

Pituitary Growth Hormone (PGH)

P re" PGH has b en er ployed in normal humans pituitary dwarfs and panhypopituitary individuals *In no case has there been any evidence of growth as measured either by meta bolic effect or actual physical growth* The older crude growth hormone preparations have likewise been of no benefit under controlled experimental conditions

Lactogenic Hormone

Has not been employed in human research Its presence is necessary for the initiation and apparently for the continuation of lactation in breasts which have been prepared for lactation by estrogens and progesterones during pregnancy

Follicle Stimulating Hormone (FSH)

FSH h s different actions in male and female In the female FSH stimulates th de lopment of ovarian follicles In the male it stimulates the germinal epithelium of the testis to produce sperma tozoa It apparently has no effect on the Leydig cells hence does *not influ nce testosterone secretion Pure FSH has not been used* clinically but in cases of hypogonadotropic eunuchoidism a puri fied preparation has been employed after initial stimulation of Leydig cells with chorionic gonadotropins to initiate spermato genesis (see page 386) At present no good FSH preparation is commercially available

Interstitial Cell-Stimulati g Hormone (ICSH) *(Luteinizing Hormon)*

A In the female ICSH apparently has a dual a tion
   1 Stimulates growth of theca cells
   2 Transforms the mature follicles into corpora lutea

B In the male it stimulates the Leydig cells of the testis with re sultant testost rone secretion

Ther is no good commercial pituitary ICSH Clinically ICSH is substituted for by use of chorionic gonadotropins which have a similar action (see page 413)

Thyroid *Stimulating Hormone (TSH)*

TSH is exceedingly efficient in stimulating the thyroid gland It has limited clinic l usefulness at present its principal uses are to differentiate pituitary hypothyroidism from primary hypothyroid ism It has also been used in an attempt to stimulate metastatic thyroid cancer to take up radioiodine for therapeutic purposes

Recently it has been advocated for treatment of thyroiditis but its place in the management *of this disease is still open to question*

Dosages 10 25 mg every 8 h s for 2 days Repeat I^{131} up take If uptake increased primary hypothyroidism is not p esent

Other Hormones

The pituitary probably elab rates other hormones (e g luteo tropin) but their exact physiological roles are not known at present

POSTERIOR PITUITARY HORMONES

The posterior pituitary hormones are polypeptides composed of 8 amino acids. Their exact chemical structures have been determined and they have recently been synthesized. Like the anterior pituitary hormones they are effective only when administered parenterally (give I.M.). They exert three actions:

1. They raise blood pressure (pressor action) (anesthetized animals).
2. Cause fluid retention without osmotically equivalent sodium retention (antidiuretic action).
3. Cause uterine contractions (oxytocic action).

To date there has not been a separation of the antidiuretic from the pressor principle. They may be identical. The oxytocic factor may likewise have some pressor effect.

Clinical Use

A. Antidiuretic. Pressor principles are used primarily for the treatment of diabetes insipidus, also to prevent and control abdominal distention. (For Diabetes Insipidus, see page 366.)

B. Oxytocin is employed in obstetrics when indications for the induction of uterine contraction exist.

Preparations Available

Name	Action	How Supplied	Average Dose
Vasopressin Tannate Injection, N.N.R. (Pitressin Tannate®)	Antidiuretic pressor	Oily solution 5 units/cc	0.3-1 cc (5-16 u) q 12-72 hr
Vasopressin Injection U.S.P.		Aqueous solution 20 units/cc.	0.2-0.5 (4-8 u) q 3-4 hrs.
Oxytocin Injection U.S.P. (Pitocin®)	Oxytocic	Solution 10 units/cc	0.3-1 cc (5-16 u) as indicated

PITUITARY LIKE HORMONES ELABORATED BY PLACENTA

The most important of the pituitary like hormones is that elaborated by the placenta during pregnancy. The hormone is referred to as chorionic gonadotropin. Its physiological action is almost identical with that of ICSH above. It has recently been shown that this hormone apparently functions only if an intact anterior pituitary gland is present. It is of no value in inducing spermatogenesis or ovulation or maintaining corpus luteum by itself. Many of its alleged effects have been due to the presence of FSH, whose action the presence of chorionic gonadotropin may potentiate.

Clinical Indications

A. In the Male

1. Cryptorchidism. In a few selected cases chorionic gonadotropin may induce descent of the testes.
2. Hypogonadism. Chorionic gonadotropin is useful in some

types of hypogonadism although testosterone medication is *generally preferred*

B In the Female Chorionic gonadotropin may aid in inducing ovulation and maintaining corpus luteum *in a few selected* cases of sterility if adequate FSH is present

Preparations Available

A Chorionic Gonadotropin N N R derived from the urine of pregnant women is available commercially under a wide variety of trade names It is mark ted in ampules of 100 500 1000 *and 5000 I U* per cc

B Equine gonadotropins derived from the serum of pregnant *mares is also available commercially This is a mixture* of FSH and ICSH It is not generally recommended because of its marked sensitizing effect and production of antihor mones by protracted use Only short co rses should be employed

Average Doses

Usual doses range from 200 1000 units e ery day or every other day

THYROID HORMONE

The active principle of the thyroid gland appears to be the iodine containing amino acid thyroxin Thyroxin probably never occurs in the free state in the organism but is contained in a protein molecule thyroglobulin Another iodine containing amino acid diiodotyrosine with weaker physiological effects is also found in the gland Recently tri iodothyronine h s been isolated from the *thyroid It is about 4 times as pot nt as thyroxin and acts more* rapidly Its exact physiological role is unknown The action of the *thyroid hormone is that of a general* cell lar metabolic stimulant with resultant incr ased o ygen consumption (e increased meta bolic rate) Its exact mod of action is unknown

Method of Admini t atio

Thyroid hormone either in the form of thyroglobulin (desic cated thyroid) or thyroxin is effective when taken orally Little effect is noted after a single dose for about 24 hours and th maxi mal effect is not reached for 6 10 days After thyroid medication is *stopp d there is a slow loss of the effect depend ng on the initial* B M R and the level reached during thyroid medication In general it may be stated that at least 6 weeks must elapse after thyroid med ication has been discontinued before one can be reasonably certain that the major thyroid eff cts have worn off

Clinical Uses.

Thyroid hormone *is indicated only in thyroid deficiency states* Its use as a general metaboli stimulant is not ind ated and is worth *less It h s been shown* that patients with thyroid deficiencies rarely require over 0 13 Gm (2 gr) of Thyroid U S P daily Patients *without deficiency states can easily* tolerate 0 3 to 0 5 Gm (5 to 7½ gr) or more daily without any effect on B M R or other metabolic

A good general rule is that *if a patient requires*

over 2 3 gr of "hyroid U.S.P daily his need for th yroid medication should be questioned

P parations A ail bl

A Thyr d U S P B P (d siec t d thyroid) Thi is the pr p a tion f ho Th e no evid n th t any of th c mm r cial prepar tions on the ma ket co taining mo o less iodine than the offici l on s e any l ss toxic To avoid confusion in dosag lways us the offi ial thyroid
Dos g 0 065 to 0 13 Gm (1 2 gr) daily

B Thyroxi Thy xin Sodium The e is no advantage of th crys t lline thyroxin ov desi c ted thyroid It is pproximat ly 300 tim s as pot nt a thyroid and so small changes in dos may l d to toxic le ls Thy oxin may b administ ed pa t ally but is almost n er n d d by this oute
Dos g 0 3 0 6 mg (1/200 1/100 gr) daily

PARATHYROID HORMONE

Pa thyr id hormon i p ot in sub tanc deri d f om pa a thyr d glands It annot be mployed lin ally f mor than a f w d y o w ks f r it apidly bec m s ineffecti (p obably through prod tion of anti hormone antigens)

Par thyr id h rmo e has a major ff t on al ium and phos phorus nd h nc bone m t b lism Its eff t i t u n in as d r nal x etion of phosphorus l ding t mobili ation of al ium and phosph ru f om bon nd pr obably t a d ect dec l if ation f bon th ough stim lat on of th e ost oclast

Be of th anti hormon ff t that d velop to pa athyroid ho mon tw othe pr pa ations empl yed in its pl e Th y d hyd ot hy t l (A T 10) and vit min D Both of th a e ia and ff t by mo th Although at fir t A T 10 wa h p pa tion f ho t now ppe rs that vitam n D i lmost qually ff cti

Si 11 t on

P thyr d hormon ind at d only in acut post urgi l hypop thy id t tany (ft id nt l r mo l f pa athyroid gland)

P p tion A il bl

A P 11 n, U S P Aqueou ol tion ont ins ot l than 100 n pe
Ave g dos 50 100 ts (0 5 1 0) 3 t 5 t mes d ily
I U as ind at d

B D h d ot t l (A T 10) Ea h ontains l 25 mg of dihyd ot hy t l in oil ol tion
Dos ge 3 (3/4 d) A T 10 daily o ally initially then th ict ia with l (1/4 d) 3 to 7 tim w kly (see pag 378)

C C lci L U S P , B P (Vit min D₂) 1 5 mg (1/40 1/12 gr) Ha s a pot ncy of 40 000 unit pe mg) (e pag 378)

THE ADRENAL HORMONES

ADRENAL CORTEX

The hormones of the adrenal cortex are all steroidal substances To date over 30 different steroids have been isolated and identified from animal adrenal glands or adrenal venous blood The vast ma jority of these steroids have no demonstrable metabolic effect Those with metabolic effect are shown in the table below

Metabolically Active Adrenal Steroids

Compounds Isolated	Metabolic Eff ct	Clinical Us	Availability
De oxycorticoste rone	Na^+ and H_2O reten tion Increased K^+ xcretio	Maintenance therapy Addi on s dis ase,	Readily available
Aldosterone (Electrocortin)	20 times as potent as DOCA	same as DOCA	Not avail able
17 hydroxycorti costerone (com pound F hydro cortison)	Ca bohydrate pro tein metabolic ef fects as produced by ACTH (in approx imate order of their potencies) Also mild effects on salt and H_2O metab olism (All have an oxygen atom at C_{11} in sterol nucleus)	As effecti e as cortisone (see below)	Readily available but expen sive
17 hydroxy 11 dehydroxycorticos terone (compound E cortisone)		1 Useful in many dis eases (see page 423) 2 Mainte nance thera py Addison s dis ase	Readily available but expen sive
11 dehydrocorti costerone (com pound A)		None	Not avail able
Corti ost ron (compou d B)		None	Not a ail able
Androstened one 11 hydroxy iso androsterone 17 hydroxyproges terone andronos terone	Androgenic (simi lar to testosterone but much less potent)	Not employed as an andro gen	Not avail able (T stos terone used see p ge 419)
Estro e	E trogenic	Not employed s su h	See page 421
Progesterone	*Progestational*	See page 422	See page 422

Questions have been raised as to wh ther or not all the steroids isolated from th adrenal cortex are tr ly naturally o curri g or whether they are artefacts produced in the chemi al laboratory Recent isolation of horm nes from blood obtained by cathet ri ation of renal veins shows that most of the hormone (about 90%) is 11 hydroxycorticosterone (Compound F) In general it may b stated that the b st demonstration of the effects of adre al cortical hormone or hormones is that seen following ACTH administr tion (see pag 423)

Cli ical Prep ations

Of the ad n l teroids isolated, three have had significant clinical u and trial

A Deso ycorti oste one Acet te U S P Deoxy ortone Acetat B P (Doc ®) It only signifi ant metaboli ffe t are od um and w t r r t ntion and in re sed urin ry potassium excr tion In this r spect it is app oximately twenty tim s as pot nt as cortisone It has no ffect on carbohyd ate or protein metabolism

B Corti one (Compound E of K nd ll) (17 hydroxy 11 d hyd o cort ost on)

1 The p incipal metabolic effects of ortisone are

a Retentio of some sodium and wat r

b Incre sed e retion of nitr gen pot ssium and phosphorus

c Incr sed blood s ga and ability to maint in blood ga levels during fasting in Addisonian pati nts

d Return of EEG patt rn to norm l in Addisonian p tient

e One of the most important eff ct is th adr nal o tical atrophy which res lts with pr longed u this is p ob bly due to dog nous ACTH inhibition and may re lt in the absence of the norm l respons of the pituitary ad enal axis to stress

2 For clinic l eff cts and use s e p g 423

C Hyd ocortisone (Compound F of Kendall), 11 hyd oxy rti os terone This compound has ntly becom availabl f r o l and loc l (g intr articular) use Its a tions a e similar to those of ortisone It is probably bout 1½ tim s as pote t a cortisone on a weight basis The m tabolic effects of hydrocortisone appear to be identi l with those of cortisone

D Whol Corti l Ext ct A wat solubl ext act of the adrenal gland Although its teroid content (if y) and mode of ction a e poorly understood this age t appea to be of value in the m rgen y managem t of ad enal cri is R ce tly an att mpt has been made to con e trate adrenal cortical extract in an oily s lution The resultant product lipo-corti al extra t is also useful, but due t the *low r absorption (from I M sit s)* and due to the f ct that it may not contain some of the essential adrenal orti al sub tance it should not replace aqueous or ti al extract Lipo-cortic l xtr ct ha been shown to contain m inly compound F (about 2 *mg* /cc) with l ss compound E

P parations Availabl

A Deso corti os one A tat U S P Deoxycortone Acetat B P (Doc ®) or De ycorti ost rone Trim thylac tat Used only f supplementary maint nanc of Addison s dis

1 Bucc l table s 2 mg tabl ts for bsorption f om mucous m mbranes Doca® is ineff cti when swallowed
Dosag ½ 2 t bl ts daily dissolved in the buc al gutt r It is almost q ally ffective in a g ven dos s when in ect d

2 Solution in s same oil 5 mg (1/12 g) per cc
Dos ge 1 3 mg (1/60 1/20 gr) I M d ily for mai t nance

3 P ll t U S P 75 mg (1¼ g) or 125 mg (2 g) e h for subcut nplantation
Dosage One 75 mg pellet for ea h mg of Doc ® requi ed by in ection up to 3 mg (1/20 g) *per day* If r qu r ments

by injection exceed 3 mg (1/20 gr) one add tional pellet should be implanted *[e g for a requirement of 5 mg (1/12 gr) per day by injection implant 6 pellets]* Duration of action 6 8 months

4 Desoxycorticosterone trimethylacetate 20 30 mg I M once a month

B Adrenal Cortical Extract N N R May be administered I M sub ut or I V Used in treatment of Addisonian crisis
Dosage 20 100 cc (5 20 dr) or more daily as indicated

C Lipo-Adr nal Cortex Sterile Solution (C A) Administ red I M only
Dosage 5 cc (1 1/4 dr) I M daily during crisis in add tion to aqueous adrenal cortical extract 1 2 cc (16 m 1/2 dr) daily for maintenance

D Cortison (Compound E) (17 hydroxy 11 dehydro corticosterone a tate) See page 423

E Hyd ocortiso e (Compound F) (17 hydroxycortisone ac tat) See page 423

ADRENAL MEDULLA

Until recently it has been thought that the adrenal medulla se cretes a single hormone epinephrine However it has been shown that extracts of adrenal medulla of cattle (U S P Reference Standard) contain two closely related hormones i e epinephri e (about 80%) and nor pinept rine (about 20%) The two have different actions as outlined below

Substance	*Blood Vessels*	*Cardia Output*	*Blood Press re*	*Blood Sugar (Glycogenolysis)*
L Epinephrine	Vasodila tion (over all)g n r lly	Increased	Elevat d ?	Elevated
L Nor epineph rine (levar terenol)	Vasocon striction (overall)	No effe t	Elevated	Elevated 1/8 that of epinephrine

*Vasodilator of coronary arteries

Since epinephrine may be synthetic or derived from nat ral sources (usually the latter) and hen e contam nated with nor epinephrine the reason for some of the apparent paradoxical physiol gi al effects of the present preparatio becomes clearer

In addition to the above pinephrine causes an immediate el vation of blood sugar by i ducing glycogenolysis in li er nd muscle

Epinept rine

A Cl n I U s *Epin phrine is us d in a great many linical* co d t ons i cluding the f llowing

1 Allerg c co ditions Bron hial asthm u ticaria angio neurotic edema and othe s
2 Co trol of superficial ble di g espe ially from muco membranes
3 Used with l cal anesthet cs to slow down absorption

4 Rare u s in cardi logy e g St kes Adams syndrome and cardiac arr t
5 D gnostic test of h patic glycogen storage
B Pr p r tions Avail bl
1 Epin phrin I j ction U S P Adrenaline B P 1 mg / c (1 1000) Administered g nerally subcut m y be given I M and ven I V if dilut d in 1 lit r of solution Dosage 0 2 1 cc (3 16 m) as indi at d
2 Epin phrin Inhalation U S P 10 mg /c (1 100) For inhalation only
3 Epinephrine in Oil I jection U S P 2 mg /c (1 500) Administ r d only I M U ual dos 0 2 1 c (3 16 m)

Arte nol (N repin phri)
A Cl I Art r n) is us d lm st ex lusively f r its sopr ss r effect U d in a ute hypot nsi states (surgi al and non surgi l shock ntr l aomotor depression and hem rrhag)(s e p 31)
B Preparation Availabl Levarterenol Bitartrat N N R (Le o ph d) l mg free ba / (1 1000) in mpul ont ining 4 cc
C Mod of Administration Add 4 8 c art renol to 1000 of any s lution f r I V u e Administer th ugh a M rphy drip bulb Det rmine re pons to initial dos f 0 25 0 5 c of dil ted s lution per 10 Kg body w ight and then m int in fl w at rat to maintain blood pressure (usu l te 0 5 1 c /min) Ar erenol is a very potent agent and great care must be employed in its use

MALE SEX HORMONE

A number of st r id l ho mon ha be n olat d f om the t tis and of th se the m st por t androg n h s be n t stost ron It is beli ved, ther for th t te tost or i the mal se ho mone Te tost rone is r pon ibl for the de lopm t of s ondary s x har t risti s in the male (i e fa i l ha r d p o) e development of penis prostat s d s minal vesi l) Admini tration of te tost ron to the fem le us s de lopm nt of m l se ondary ha t isti s In the fem l the adve se nd o geni ff cts c n be p rtially over ome by the imultaneous administ tion of t ogens

Of s great or gre t mportanc than i and ogeni ffect is the prot in naboli (tis u building) eff t of t stost on In ad d tion, t ste one has mild sodium hloride and wa e t ining ff cts

T ne ron
T t tost ron nd t stost rone proplon t a e not f ctive when sw low d At pre nt he only w y t dmini r thes agent ff ctively is to p ce them unde he kin by inje tion or as pell ts A t tost one pr parat on whi h dre not or s natur lly m thyl t stos one (MT) i ff ive when sw llowed M thy t ost one t stos one (MT) t mark d c e tinuria nd has appar nt y produced in humans induc jaundice aft prolonged dmini t at on otherwis how ver i metabolic and and og nic ff s re imil r to those of t stost rone

and testosterone propionate Testosterone and testosterone pro pionate when injected (or swallowed) are partially (about 30 50%) excreted as 17 ketosteroids in the urine Methyltestosterone is not excreted as 17 ketosteroid In fact its administration will result *in diminished urinary 17 ketosteroids* due to diminished endogenous testosterone production

A <u>Cli ical Us s</u> In either sex testosterone may be indicated in any debilitating disease for its protein anabolic function In addition there are certain uses specific to the different sexes
   1 Male As replacement therapy in failure of endogenous testosterone secretion (e g eunuchoidism male climac teric etc) Its use in psychogenic impotence angina pectoris homosexuality and benign prostatic hypertrophy is without benefit
   2 Female
      a Gynecologic conditions Functional uterine bleeding en dometriosis dysmenorrhea and premenstrual tension
      b Diseases of the breast Advanced carcinoma chronic cystic mastitis suppression of lactation

B <u>Preparations Available</u>
   1 Testosterone <u>U S P</u> (Free)
      a Pellets U S P 75 mg (1¼ gr) implanted subcut <u>Dose</u> 4 8 pellets every 3 4 months
      b <u>Micro</u> suspension in aqueous solution for I M use The dosages have not yet been determined but appear similar to testosterone propionate in oil
      c Ointment 5 mg /Gm (2½ gr /oz) for local testosterone effect Average dose 0 5 1 0 Gm locally rubbed in over 5 minutes b i d
   2 Testosterone Propionate U S P B P In oil for I M in jection 5 10 25 and 50 mg /cc Dose varies from 10 100 mg (1/6 1½ gr) daily depending on condition being treated
   3 Testosterone Cyclopentylpropionate N N R (Depo testost r one®) in oil for I M injection 50 and 100 mg /cc This preparation has a duration of action 2 to 5 times or more that of testosterone propionate <u>Dosage</u> 100 200 mg week ly to 500 mg monthly in a single dose
   4 Methyltestosterone U S P B P *Do not use methyl-testosterone in treatment of thyrotoxicosis acro-megaly and gigantism or liver disease*
      a Tablets 5 10 25 mg for oral use
      b Tablets 5 10 mg for sublingual o buccal administra tion There is no advantage of buccal over oral use of the hormone
      c Ointment 5 mg /Gm (2½ gr 1 oz)
   5 Methylandrostenediol (methandriol) It has be n claimed that this is a potent anabolic agent without the virilizing ef fect of testosterone There is little evidence to support the claim Its anabolic effect is quite poor and erratic and the evidence for a dissociation of anabolic and virilizing ffects with this hormone is lacking
      a Tablets 25 mg (3/8 gr) for oral use
      b *Micro suspension in aqu ous sol tion for I M us* 50 mg /cc <u>Dose advised</u> 25 50 mg (3/8 3/4 gr) d ily

C <u>Ch ice of Prepa ations</u> In view of th great number of

p ep rations available it may be difficult to decide whi h to use The physician should choo e thos preps ations whi h are most e onomical to the patient and still are effective Th use of testost rone by repeated inj tions should be re erved only f r those very few ondition wher m thylt stosterone should not be us d where th p tient must be under very close obser ation (pref bly in a hospital) or where th dose must be very e act (i e research) Even in the cas s in which methylt s tost rone cannot be used pellets of free testosteron may be give to the p tient or relatives may be in tructed in the ad minist ation of I M medic tion Therefore the tr atm nts of chol become m thylt st sterone orally implantation of testosterone pell ts or t st ste one cyclopentylpropionate

FEMALE SEX HORMONES

The f mal ova y secrete two steroids with mark d physio logi l eff ct namely e trogen (a-est diol) and p ogeste one

Estrog

A Eff t of Estrogens in the H man The p imary ctions of e t g s

1 P olif ration of endom tri m
2 Change in vaginal cells (ornifi ation and lowering of vagi al pH below 4 0)
3 Duct l prolif ration of bre sts
4 Stim lation of osteoblastic a tivity
5 Slight prot in anabolic eff ct
6 Moder te sodium and wat r ret ining ffect

B Cli i al I Estrogens are usef l in both s xes for their ff ct on ost obla ts in the t atm nt of ost oporosis

1 Fem le E trog n is sed as replaceme t ther py in cases of o a tan f ilu e (e g m nopa)
2 Male L ed as adjunct t ther py of carcinom of prostat

C P epa tion A ail bl Ther ar many substanc s that ha e t og t l y in luding non ster id s b ta (g d.ethyl tilbest L di n st ol he trol) However of all the st r ids only cert in of them are usef l lini ally Th e is no e idence th t any of the strog ns are l s toxi than any other To i ity (i e n sea nd vomiting) i usually due to overdos ge Most of these trogen a e e dingly pow rf l drugs having profound physiological ff cts i very sm ll dos s and also having the ape ti and toxic levels that are quite sim ilar Th phy ician should s lect t o 3 good p par tions and learn their har ct isti s rathe than change to new ones The is litt or no need at present to administ r these e tro- gens by any but the or l rout bsorption eems to be very complet and there is no idence that naus o vomiting can be decreased by p rent al administ tion There is likewise no evidence that the "naturally occu ring e trogens a e any more effi acious than the synthetic ones Although strogens apparently play a role in mammary tumor of animals the e i no evidence that they are carcinogenic in human

available little can be said as to duration of therapy It would appear at present that prolonged administration will be necessary in *many cases Where knowledge is available regarding* recom mendations for treatment these are indicated in the text

Dang rs

These agents are potentially very dangerous However with *proper caution most of these dangers can be overcome* The prin ciple dangers are that these drugs may induce

1 Hyperglycemia and glucosuria (diabetogenic effect) This is of major significance in the early or potential diabetic
2 Marked retention of sodium and water with subsequent *ed ma increased blood volume and hypertension*
3 Neg tive nitrog n balance with loss of body protein
4 Potassium loss with development of a hypokalemic alkalosis
5 Hirsutism and acne (especially disagreeable in females)
6 *Cushing s syndrome (may develop with long continued ad* ministration)
7 Activation or production of peptic ul er
8 Lowering of resistan e to infectious agents

Controls to Be Employed to Correct or Minimize Dangers

A *Always reduce the dosage as soon as consistent with the clinical response*

B It is desirable that the patient be hospitalized during the initial period of treatment of 1 2 weeks but this is not nec ssary in all cases

C During the first 2 weeks of therapy the following should be care fully observed

1 Blood pressure daily o every other day
2 Weight daily or every other day
3 Daily eosinophil count for a few days to judge initial response to medication with ACTH
4 Initial complete blood count repeat as indicated
5 Initial sedimentation rate repeat as indicated
6 Frequent urinary sugar fasting blood sugar if reducing sub stances are found in the urine
7 Serum potassium should be checked occasionally if large doses of hormone are to be given over more than several days

D All patients should be on high protein diets (100+ Gm proteins)

E If ed ma de elops place patient on low sodium diet (200 400 mg sodium daily) Mercurial d uretics may be mployed *wh n* strict sodium restriction is impossible

F Potassium chloride 3 15 Gm daily in divided dos s should be admin stered

G In cases of long continued administration testostero e prep arations (see page 420) *in dos s of 10 25 mg daily* may be used to counteract the negative protein and potas ium balance

H Do not stop eithe drug abruptly Th re may be a severe rebound of the d sea process Also rem mber that corti sone (or hydrocorti one) causes atrophy of the adrenal cort x probably *through endogenous* ACTH inhib tion udden with drawal may lead to symptoms of Addison s di ease

Contrai di tions and Speci l P tion

A St in P t t R ing M t n Co ti one (or h d o o t on) P t e ts r ce ving c tis e or hyd ocortisone only e pecially the or l prep ration mu t be car fully w tch d and managed Be a of the s ppre sion of e d g nous ACTH and a bs que t adre l c rtical atrophy thes pat ts a e unable to r spond normally to stre ful sit tions (g su gery in fections etc) Whe ve such a ituation occ s or is to occu the do ge of c tisone o hyd oc tisone should be rais d and/or p r nteral ortisone and ACTH gi n If o l *cortisone or hydrocortisone only* an be *adm ist red* it must be admini t red in larg r do es t l t e ry 6 h u s

B H rt Di e Thes ag ts should be used w th tr me tion in i dividual with damag d myoc rdi m The in cre in ext acell lar fl id m y le d to ardiac de ompe sa tion Alw y begin with sm ll doses and with pati t on low sodium diet

C S ve R l Dis Th d g is probably contr ind c t d o hould be us d with str m ca tion in pati nts with m jor re l damage ssociat d with edem and/or oliguria

D Hype nsitivity t th D g Certain di se ppe to m ke *the indi d l mo e n t ve t these ag nts This is e pe ially* true of the llag diseas e pe ially lupus ryth matosus It i usually be t t begin with low do ge a d incr s ca tious ly in thes individuals

E P disposition to Psy ho i The drugs e a s nse of w ll bei g nd phor in most individual r eiving th m but som indi idu ls (thos p di pos d to p ychosi) may de lop an ut p ychotic epi od whe the drug i dmi i tered I the e it hould be stopped or the dos should be low red and the p ti t should be f lly ob ved and prot cted P son h ve ommitt d ui ide under the influence of the drugs

F Eff ct on Th id When given *for prolong d pe iods* the e drug m y dep thyroid function Thi may inhibit the a tion of ACTH on the ad nal ort x and pos ibly the ction of c ti sone on the ti sue ll of th body

Give pplement l thyroid 65 200 mg (1 3 gr) if th s drug are to be given for more than 3 4 w ek

G Eff ct on P pt Ui e

1 A t pept is a cont indication to us of th d ugs becaus of dang r of perfor tion o hemor hage

2 O d peptic ul r The s agents t d t a tivat the lc r They hould be us d in the presenc of this di only as an eme gency to s ve lif and with optimum anti ulce therapy

H T berculos Active or r c tly he led t berculosis i a ont i d t on t the u e of the drug

I I ecti D Ber use the *drugs tend to low r r i t* anc and therefore t promot d mination of in ctions they must be us d with extreme aut on eve when ppropr i te antibioti s a e bei g given, i a y acut or chronic infection

E Surgical Exploration (e g simple incision thoracotomy or laparotomy) May be indicated as a final evaluation measure In many cases the surgeon must be prepared to perform a radical surgical operation if macroscopic or *frozen section* examinations indicate malignant disease

F Re examination *Upon completion of the clinical studies emphatic reassurance of the patient regarding the negative findings is necessary* If findings are equivocal the patient should be kept under close follow up observation with appropriate diagnostic measures

Sugg stions for Treatment

A Factors Influencing Choice of Tr atment
1. Nature (inher nt characteristics) of the given neoplasm rate of growth cytological characteristics invasiv ness amenability (e g radiosensitivity or radiocurability) tendency to metastasize and nature of metastasis
2. Age of patient
3. Physical and emotional status of patient
4. Patient s ability and/or willingness to cooperate with the prescribed therapy
5. Availability of professional and technical facilities
6. Stage of the tumor at the time the patient is first se n
7. Location of the lesion Proximity to vital or tubular structures
8. Secondary complications of the disease Local pressure symptoms hemorrhage systemic effects of the primary lesion and the metastases
9. Functional cosmetic and psychological effects of therapy
10. Patient s ability to tolerate radiation therapy (i e tolerance of solar or other radiation)
11. Cost of therapy

B Treatm nt of Benign Lesions The physician s clinical impression of the benign character of lesions must always be verified by biopsy and microscopic examination
1. Simple eradication of the tumor by surgical technics (includ ing curett ge and cauterization) is usually the preferred method of treatment Radiation technics may occasionally be employed
2. General indications for removal of benign tumors
   a. Diagnostic purposes (possibility of malignancy)
   b. Pressure on vital structures
   c. Obstructive symptoms
   d. Mechanical (st tic) deformities
   e. Pain or oth r marked discomfort
   f. Systemic effects (e g hormonal)
   g. Hemorrhage (acute or chronic)
   h. Cosmetic purposes
   i. Psychological purposes (reassuranc)
3. More extensive surgery The surg on must be prepared to perform radical surgery if macroscopic appearance or frozen section examination indicate malignant disease

C Treatment of Malignant Lesions
1. Primary lesion
   a. Complete eradication of the primary lesion by surgical

(in ludi g urettag and c t rization) or radi tion m thods mu t be att mpted wh ever pos ible

b Radical su g ry Clinical evidenc of r gion l m tasta sis may ind t need for r di l s rgi al removal of th primary tumor and th i l d node

S rgi al r moval of the primary t mo m y still be indi c t d when m tast ses re sy temic b t a e gr wing v ry lowly (g thyroid carcinoma)

d R diation ther py m y be us d to arr st or slow the p og ss of th di e if the tumo is r di se siti e

e Ch mothe apy Se below

2 Metast tic lesions

S gical e ci ion may be of val e wh le ions s li tary slowly growing p inful, or when they produc other ute symptoms (obstru tion tc)

b Radi tion ther py is indi t d if l ions re radios nsitive a d pa ticul ly if they a m ltipl diss min t d

Chemoth rapeutic m thods may be employed u ing the spe ific ag t which r known t aff ct c t in types of p im y and m tastati t mor The ag nt ar ordi n rily withheld til the is 6 finite n d f r symptomatic reli f

(1) Androg ni nd st ogenic t roids Definit bene fici l ff ct have been ob rved with the mpi ic l u of the st r ids in certain neopla ti di eas s but m ch of th work r m in on an pe im t) b is Th d tion of eff ct i unknown Steroid thera y fa n uen c rattle and shou d never replace radical surgery o operable conditions

( )E trog Th d ge of the e t oge s m t be individ li d ording to the pati t e espon and the t l ity of th dr g (anor i n u a di rrhe d matitis nd d ma)

(1) Soft ti sue m t st from bre st a inoma (t lung brain et) T anal t improve m nt occurs i mall per t ge of ld rly pati nts In gen r l, estrog re r served for pat ts 5 or mor y rs p st the menopau e Give Di thylsti bestrol U S P 5 30 mg (sually 10 15 mg) or Ethinyl E t adi l N N R 0 2 0 5 mg orally d ily Cyclic l admini t tion (i 40 days on 10 d y off) is commended

(2) P ost tic r i oma nd m tastas s (se p ge 309)

(b) And og s M thyl t ost rone U S P 5 10 mg sub i gually daily or T tost rone P op onat U S P 75 200 mg I M 3 times w kly p r n may be indi t d for

(1) Car inoma of th t or ov y Gives partial or comple r li f of p in f r vari bl pe iod but no objective imp vement

(2) B st a cinom Sk let l m t stase in 15% of c se how imp ovement but on y occasional improvem nt is obs ved in soft tissue met sta s

(2) Nitrogen mustards Although employed with benefit in certain cases of metastatic carcinoma these agents have proved most beneficial in certain diseases of the blood and lymphatic systems (see page 241)

(3) Mustard like compounds (TEM TEPA) Similar to the abov although less toxic (see page 238)

(4) Antimetabolites (aminopterin 6 M P) See pages 233 239

(5) Urethane® See page 239

(6) Radioactive salts *Eff cts are due to radiation rather than chemical action*

3 When none of the above procedures is possible

a Narcotic drugs Liberal but judicious use especially i advanced and terminal malignant disease

b Surgical measures

(1) Reli f of specific symptoms Surgical intervention (e g tracheotomy thoracentesis paracentesis lumbar puncture etc) may be necessary to control progressive or emergency obstructive or other pressure symptoms

(2) Nonspecific *surgical methods (hormonal modification)*

(a) Adrenalectomy Bilateral removal of the adrenal glands can sometimes produce a substantial regression of e tensi e and widespread male and female mammary cancer Although there is objectiv as well as subjective evidence of improvement the relief is most often of temporary nature This is still largely a research technic since it is a major operative procedure expensive and requires careful follow up steroid replacement therapy The use of this procedure in the treatment of other neoplasms is being investigated but no significant statistics are available at present

(b) Ovariectomy Remo al of the ovaries has been advocated for some time as a treatment for advanced *breast cancer The results of the operation are* usually transient and the relative efficacy of the treatment has be n questioned

(c) Orchiectomy Castration may result in significant *regression of primary and s condary tumors of the* prostate and mal breast In patients who fail to respond to orchiectomy subsequent adrenalectomy may prove to be effective Subjective and objective relief may persist for more than a year

D General Problems

1 Explanation to the patient

a Factors of importance Opinion varies greatly as to whethe or not it is advisable to inform patients that they have malignant neoplastic disease This matter must be individualized and must naturally vary with the temperament intelligence attitudes and desires of the patient Under certain circumstances it may be necessary or advisable to inform th patient as to the true nature of his condition irrespective of the above factors

(1) *If the patient demands an explanation of his illness*

(2) If the p ti nt s e onomic status requi s forewarning to permit proper dispo ition of state etc
(3) If th p ti nt refuses to carry through on a p escribed diagnostic and/o th rapeutic regimen
(4) If the n opl sm is g owing relatively slowly is non in asive and is r dily tr tabl
(5) If the patient e ha ts (or th tens to xh u t) his finances in a sea h for a c re

b Manne of xplan tion If xplanation is indicated use mild term s ch as growth lump or even tumor but in most cases it is advis ble to *avoid the term cancer* Be guarded in st tem nts s to prog n sis and lean towards th optimi tic side *Always offer some ray of hope* When the clini l situation is not utterly hopel ss a che rful opt mistic and r ass ing attitud m y do mu h to all y the fears and ap pr hension of the patient and the f mily

2 Expl tion to the family It is oft n advis ble to inform a n ar relative (pr f rably the mate when thi is fe sible) f the n tu e of the illness and the prognosis Th qualifying fact rs mentioned above should be kept in mind in d ciding who how and what to tell

3 Provi ion fo hronic and te minal ca

a Assistanc of social age cies In view of the chronicity and the p ychological and socio economic implic tions of th illness the h lp of a medical or social gen y is advis ble in ppropriat cases

b Hospital or nursing hom care m y be indi ated Hom a e If patient and f mily decide on home care it will be necess ry to instruct on or more m mbers of the family in the t chnic of administ tion of drugs (especially pare t r l n coti s)

TREATMENT OF ADVANCED MAMMARY CANCER

	P m opa l	Postm op l
EXCISION OF GONADS (OVARIECTOMY) ↓ Elimin t l fun tion	Imp m nt i f w Be ficial It ly l at l ger than 6 12 m ths This m thod ld m d at th p t tim	E l eff cti e than in prem op sal an r
OVARIAN IRRADIATION ↓ Elimin t s rian fun tion	B f i l s lt in f i mbe of f pe iod up to on y o m r Be t s lts i bo y m t t e (69%) and p im ry and pl u al l ion (50%)	Le ff t than in p m nop l r
ANDROGENS ↓ P ot in an b li ff t (?) Ov ian pp i n	Symptom ti li f in 66% of p ti t and obj ti imp vem t i os ous and soft ti m t t in 20% of pati t P rh p light p olong tion of lif s w ll p lli tive ff t	I uffi i t xpe
ESTROGENS ↓ Empi i l ff t	V i bl po E t g hould p obably be d ONLY 5 m y r ft m op e	S bj ti imp m t in bout 60% of and obj tive improvem t in 25% of cases P ti ts f vo ably ponding t t tm nt m y h om p olongation of lif
ADRENALECTOMY (BILATERAL) ↓ El mi t p odu tion f and g lik and st g lik t ids (P ti t m int in d on rti on and D O C A aft op tion)	In uff t xp i	S bj ct ve obj ti imp m t in l m i d umbe of p ti ts t t d with thi th apy l st rt

METHODS USED IN TREATMENT OF NEOPLASTIC DISEASES

[illegible]	Mechanism of Action	Suggested Uses
RADIATION X y R [illegible] Radi [illegible] R phosphorus Radioactive Rad gold	K mor d y mary or econ y umor Des tur on of p m y or econda y umor	Cur or pal t on of many p im y umor pall ion of symptom econd ry tumor C or palli on of many p im ry or ondary tumors lymphom ous tumor leuk mias
HORMONE TREATMENT Androgens	S lec ive d t on and dest on d mor t	P lycythemi P im y and econda y anc r of thyr id Se ou l tumor with fl id accum lation
[illegible]	P ot in anabol r t ov an app m l	Advanc d an of br
[illegible]	[illegible]	Ad anc d ar inom of b t and pros
[illegible]	[illegible]	A ut l uk m (only h used tog he wi h an l foli compound)
[illegible]	[illegible]	Ad anc d anc of f m l and l b
[illegible]	[illegible]	Canc of b t
[illegible]	[illegible]	Canc of m b anc of p oal
ANTIMETABOLITES Anti folic A d Compound Aminopt in A Methot in and A in Ami ino A d Compounds 2 6 Diamino Pu ine 6 M 4 opur ne (6 MP)	Compe ion with folic id blocking of ynthe i of nucleic id ne ry for umor growth Compet on w h m no ac d of ynthe i of mine ac d ne y for umor g owth	A leuk m is ported t be uc f l in t l t d ron omatou and lymphom ous tumor
NITROGEN MUSTARD COMPOUNDS HN2 (Met yl bis(2 chlor y) l m ne HC l)	Diff ent l t lci y t tumor l ue	A ut l uk m port d be suc ful in le i d om tou and lymphom ous tumor
ETHYLENE IMINE COMPOUNDS T ethylenemel mine (TEM) T e ethylene m (TTP)	Diff ent l t i t y t t mor t ue	Hodgkin di as mycosis fung id h onl lymphocytic leuk mia (p t nt i good gene l condition)
Sta [illegible] h and bul he pr m	D f l ty t mo ue	Ch onic myelogenous l k mi hronl lymphocyti l uk mia Hodgki di lymphos om polycythemi ve a Hodg in' d undif t t d anc o lignant m la nom monobl om m ltipl myelom

Chapter 17

VENEREAL DISEASES

SYPHILIS (Lues)

An acute or chronic disease caused by infection with Treponema pallidum It may be either congenital or acquired The acquired form of the disease is usually transmitted genitally but may be ac quired by extragenital routes

DIAGNOSTIC FEATURES

Primary Syphilis (code No 147)

A History of contact with an infected individual 1 6 weeks (usually 3 4 weeks) prior to appearance of primary lesion

B *Primary lesions are pleomorphic may be single or multiple* and are usually located on the external genitalia although *extragenital chancres are not rare*

C Three or more carefully performed dark field examinations (on successi e days) are necessary before a final report of nega tive may be made

D Both complement fixation (e g Kolmer) and precipitin (e g *Kahn) tests should be performed Quantitative blood tests (per* formed by a reliable laboratory) since they may demonstrate changing titers are preferred for both diagnostic and follow up purposes

E Regional lymph nodes on one or both sides are often rubbery discrete and non tender

Secondary Syphilis (code No 013 147)

A Us ally o urs 7 10 weeks after exposure to the disease and 2 3 weeks after appearance of the primary lesion

B There is often evidence of systemic involvement with fever generalized lymphadenitis non pruritic maculopapular derm titis nasopharyngitis laryngitis conjunctivitis alopecia arthralgia mucous patches and condylomata

C *Blood tests for syphilis are almost invariably strongly positive*

D Cutaneous and mucous membrane lesions may show *Treponema pallidum* on dark field examination

E Spinal fluid usually shows transient involvement

Relapsing Syphilis

A U ually occurs within 6 months to 2 years after onset of the disease

B Often follows inad quate or improper therapy (e g peni illin for coexistent gonorrhea)
C Blood tests for syphilis usually revert to a positi e r action or if alr ady positive to an increasing se ologic tit r (based upon quantitati blood te ts)
D Relapse may be of s veral clinical types Th commonest of these are m cocutaneous C N S ocular and s rological (the latt r in th absenc of clini l evide ce)

Lat nt Syphilis (ode No y00 147) (E rly late t les than 4 ye rs lat lat i mor than 4 years)

An interm diate or quies nt phas aft r s condary l sions ha e disappeared and while tertiary symptoms are not yet evident

A Latent syphilis offers no linical viden e of lue oth r than th positi e blood t st It is th ref re important to rule out f ls positive blood t sts the most ommon c s of which are technical or cleric l rrors acute f ve yaws infe tious mononucl osis mala ia l prosy l ishmania is smallpox vaccin tions and lymphogranuloma venereum

Never make a diagnosis of latent syphilis solely on the basis of a single blood test Rule out the possi bility of the above factors If the blood test is only very transiently and weakly positive the dia nosis of lues should be ques ioned Conversely if the blood test is persistently positive for 3 o more months lues is the most likely diagnosis

B Spinal fl id must be compl t ly n g ti e

Late (T ti ry) Syphili (ode N 014 147)

Invo ment m y be diff may be onfi ed to ce tain organ syst m o may be localiz d as dis ete granulomatous le ions (gumm ta) in any and all tissues

A Mucocut neou Gummatou l sions of the skin and mucou m mb nes
B Os ou Diff s o gummatous l ions of bones and joints with periostiti arthriti synovitis and osteomyelitis
C Ocul Conjun tiviti i itis u veitis horoid tis k atitis and h rior tinitis
D Vi al (e lud ng diac) G mmatou or diffuse involve m nt of li r pan s lunge spl en, kidneys and tomach
E Ca di v
1 U ompl at d a rtitis (cod No 481 147)
2 Aortic r gu git tion (od N 455 147)
3 Aneurysm (od N 481 147 6)
F N vou S t m
1 A ymptoma ic n rosyphilis characteri d by spinal fluid abnormaliti (Group I and II see page 438) but without vidence of symptom or sign of neur ogical involvement
a M y be classi ed, a ording to C S F chang (s page 43) as mild, mode t o severe (Groups I, II or III)
b If untr t d may deve op int c anic l ne rosyphilis
c M y oc ur during an phase of lues
2 Symptom tic
Acute syphil tic m ing ti (de N 812 14 0)
(1) Usua ly occurs within 2 years aft r infection

Special Considerations Regarding Penicillin Therapy

A Herxheimer's reactions usually of a mild degree occur with marked frequency and consist of fever and generalized aches and pains within 24 hours after onset of therapy

B Some clinicians feel that in late syphilis it is necessary to administer a course of bismuth and iodides prior to penicillin therapy in order to diminish the hazards of Herxheimer s reaction or "therapeutic paradox These dangers if they exist *at all are minimal*

C Sensitivity to penicillin (see page 505) contraindicates further use of the drug

D Relapse following one or more courses of penicillin therapy requires consideration of other therapeutic ag nts

Aureomycin® Treatment Methods

Oral Aureomycin® has been reported to be effective in the treatment of *syphilis but clinical experience with the drug is not extensive* Optimal dosage schedules toxicity failure rates etc remain to be determined One Gm every 4 hours day and night for a total of 70 90 Gm has been suggested Its use may be considered in those patients sensitive to penicillin

Bismuth Treatm nt M thods

A Indic tion

1 As adjunct or supplement to penicillin therapy enhances antiluetic activity of that agent

2 *Preliminary* to penicillin therapy in latent or late lues when Herxheimer s reaction is feared

3 *In cases* of multiple antibiotic sensitivity

B Contr indi ations, Severe stomatitis or severe renal damage

C Drugs Availabl

1 Bismuth Subsalicylate Inj ction U S P 0 2 Gm I M once weekly

2 Iodobismuthite sodium with ethyl aminobenzoate (iodobismitol with benzocaine) 2 cc I M every 3 days 16 20 injections comprise a course of treatment If necessary such therapy may be continued over a long period of time (2 cc 0 025 Gm metallic Bi)

D Technic of Intramuscular Injection with Bismuth

1 Cleanse skin of outer upper quadrant of buttock with alcohol sponge

2 Agitate bismuth vial vigorously for one minute to ensure a uniform suspension

3 Aspirate bismuth susp nsion in a st rile 2 cc syringe through a 1 inch No 20 gauge needle

4 Replace the 1 inch needle with a 1½ to 2 inch No 20 22 gauge needle

5 Draw the buttock downward with the free hand and with a wrist motion only plunge the needle quickly *into the muscle* Insert needle more deeply if necessary

6 Aspi ate with th syringe for 10 seconds to make certain that no blood vessel has been entered If any blood appears choose another injection site

7 Inject bismuth suspension slowly and steadily

8 Detach syringe from needle and inject ½ cc of air

9 Withdraw needle with a single rapid movement
10 Massage (or have patient massage) the area firmly for about 5 minutes

DIFFERENTIAL DIAGNOSIS OF VENEREAL DISEASES

Disease Organism and How Demonstrated	Test	Lesions	
		Bubo	Genital
Syphilis Treponema pallidum (Dark field exam)	Complement fixation (e g Kolmer) and precipitin (e g Kahn) test	Non fluctuant	Painless ulcers
Chancroid Hemophilus ducreyi (Gram stain)	None	Usually fluctuant	Painful ulcers
Lymphogranuloma venereum virus (Culture method)	Complement fixation test Frei test	Usually fluctuant	Painless evanescent ulcer
Granuloma inguinale Donovan bodies ? (Wright stain)	None	Usually none	Painless spreading ulcer
Gonorrhea (Gram stain) Neisseria gonorrhoeae	Complement fixation (value ?)	None	Urethritis

GONORRHEA

Gonorrhea is an acute or chronic infectious disease caused by the gram negative diplococcus Neisseria gonorrhoeae and is practically always transmitted among adults by sexual intercourse. Acute gonorrhea in the adult male is characterized by an acute urethritis with painful urination and purulent urethral discharge. Chronic gonorrhea may be manifested by chronic inflammation of the urethra, prostate, epididymis and seminal vesicles but rarely if ever of the upper urinary tract. Gonorrhea in the female begins in the urethra, vagina and vaginal glands and is characterized by painful urination and purulent discharge. Commonly the infection spreads to the uterus, tubes and other pelvic structures causing abdominal pain and tenderness with evidence of constitutional symptoms. Systemic infection with septicemia and manifested by endocarditis or arthritis is less common. The organism has a strong affinity for the ocular mucous membranes and may cause a serious and blinding ophthalmia.

Diagnosis

A. History of genital discharge and dysuria occurring 4 to 10 days following sexual intercourse with an infected individual. Symptoms will vary with the anatomic structures involved. Demonstration of the gram negative intracellular diplococcus in smears from lesions by stained (Gram or methylene blue) and by culture. Blood cultures may be positive in patients with septicemia. Complement fixation test may be positive several weeks after the initial infection.

B. M → Genital Tract Involvement

1 Urethritis acute anterior (code No 744 103)
   a Smear and if necessary culture of material obtained from the urethral meatus will demonstrate the causati e organism This is obtained by urethral stripping and never by any other method during the acute phase The discharge is universal in the chronic phase
   b Two glass test Acute first glass is cloudy the second is clear Chronic both glasses contain shreds
   c Clinical symptoms are most oft n acute and definite Prostate and seminal vesicles may become invol ed
2 Prostatitis acute (code No 764 103) Urethral discharge may or may not be increased Smear and culture findings will be as above Perineal pain is common and is increased by defecation Low back pain may be present Constitutional symptoms such as fever and chills may be present Dysuria is frequent and retention may occur
3 Acute epididymitis (code No 756 103) History of current urethritis Smear and culture findings as above Th re is also testicular pain swelling warmth and redness

C Female G nital Tra t Involv m nt
1 *Acute urethritis (code No 740 103) Smear and (preferably)* culture of urethral and vaginal discharges should be per formed There is redness and swelling of vaginal vestibule and external meatus
2 Chronic gonorrheal infections (after 4 6 weeks)
   a Very careful and repeated cultures and stained smears of *material obtained from Skene s B rtholin s* or endo cervical glands (For technics see U S P H S VD bulletin 97 1945)
   b Pelvic inflammation (code No 066 103) may be charac terized by lower quadrant abdominal tenderness mass peritoneal irritation and systemic manifestations

Treatm nt

Penicillin streptomycin Aureomycin® Terramycin® and the sulfonamides are all effective anti gonococcal agents although peni cillin is g nerally the drug of choice

A Acute or Chroni Un omplicat d Urethritis (male or female) (cod No 740 103) *Avoid all local treatment such as irrigations manipulations and instillations*
1 P nicillin th rapy Several effective t chnics are a ailable *Always draw preliminary blood specimen for sero-logical test for syphilis and examine patient clin-ically for evidence of syphilis since the danger of masking early syphilis by penicillin treatment is very real*
   a Crystalline Pe icillin Procaine in Oil Injection U S P 600 000 units I M as a single injection a convenient method for ambulatory patients

   or b Penicillin (aqueous) 30 000 60 000 units every 2 hours for 5 doses (tot l of 150 000 300 000 units)
2 Alternative therapy *If coincident lues is suspected the above treatment should be altered as follows*
   a Penicillin Reduce total dosage of p nicillin to no more than 150 000 units

or b Sulfonamid treatment.
(1) S lfadiazin or sulfathiaz l 4 0 Gm (60 gr) o ally Stat foll wed by 1 0 Gm (15 g) every 4 hours day and ight for 5 d ys for hospital patients
(2) S lf di ine or sulf thiazole 1 0 Gm (15 g) orally 4 tim s d ly for 5 7 d ys f r ambul tory pati nts (30 40% failures by this method)
or c Combined peni illin (redu ed dosage) and sulfonamid
3 Follow up Should con i t of xamination of th patie t at w kly int rvals for at l st 3 weeks or pr f ably
a W ekly ex min tion f r evide e of urethr l dis harg han or rash
b Stained smear and if po sible ultur of any inflam matory exud t w kly *Avoid prostatic massage urethral swabs or instrumentation as a means of obtaining material for examination in acute c ses*
Blood test for syphilis and examin tion for clini al evi d n e of l e at the e d of the third week and again at 3 6 12 and 24 months
4 Retre tm t of penicillin failures (susp ct other etiology) If any of the weekly checks hows b cteriologic evid c of pe sist t gonorrheal infection repeat the penicillin tr at me t a abo Consid th pos ibility of urological com plic tions If su h can be reasonably exclud d onsid r t atm nt with
a In reas d dos ges f penicillin
b C mbi ed penicilli nd s lfonamid utili ing a com bin tion of the p ocedures me tioned above
c Streptomycin 0 3 0 5 Gm I M as singl dos
d A r omycin® 1 0 Gm or lly Stat and then 0 5 Gm at 6 hou l t als for 4 6 dos s
Ter my in® 1 0 Gm o ally Stat nd 1 0 Gm r peat d in 6 hours
5 P r i t nt f llures Often s alled t tm t f ilu e ct ally reinfe tions this is beca e these p tie ts and the publi at l ge h ve c m to believe that mod rn tr t m t m thod ha now rende ed th d ase trivial in nat e The dang s of ch a oncept m t be mad app ent to the patient

B A ut nd Ch oni Prost titi (ode No 764 103) Tre t s bos lliot sit ba hs and ik li i tion of the u ine may p o id symptom tic reli f

C Acut Epididymiti (od No 756 103) Abov t tment in li on t
1 Bed r t
2 C d ompr s s to rotal region
3 Ana g i s r li f of pain
4 Supporte to be used d ring con al sce t mb lat ry phas

D P lvic Inflammat ry Di (A ut Gonococcic Salpi gitis
1 A ut
a Absolu e bed rest
b [illegible] unnecessary m nipulation durin [illegible]

c Examine carefully for clinical evidence of lues Draw blood for serological test

d Penicillin 50 000 100 000 units every 3 hours day and night for a minimum period of 5 days or until patient is afebrile for 2 days

(1) Convalescent period If patient becomes afebrile and asymptomatic keep her at bed rest until WBC and sedimentation rate become normal (may take a month or more) Observe the patient during and following her next menstrual period for pain and pelvic changes if these are absent discharge her to home care on the convalescent program o tlined below

(2) Retreatment If symptoms fever leukocytosis in creased sedimentation rate or positive vaginal smear persist or if they rec r at the time of m nses ad minister a second course of penicillin

e Retreatment with sulfonamides If the patient fails to respond to 2 courses of p nicillin therapy give 4 0 Gm (60 gr) of sulfadiazine or sulfadiazine sulfamerazine mixture and follow with 1 0 Gm (15 gr) every 4 hours for 5 8 days Give equal or double amounts of sodium bi arbonate with the sulfonamid s *Observe usual precautions for sulfonamides*

f Pyrotherapy In the rare case that fails to respond to penicillin and th sulfonamides pyrotherapy may be of val e This must be given only by experienced personnel

g Convalescent program Aft r the patient is discharged from the hospital give the following instru tions

(1) Sedentary life

(2) No sexual intercours until signs and symptoms have completely cleared (*usually tak s about 6 8 weeks*)

(3) Douches Prolonged douches of warm tap water using 1 2 gallons and administering slowly and gently over a 15 20 minute period once or twice daily The patient can perform this procedure m st effectively while sit ting in the bathtub

2 Subacute (or cute exacerbation of chronic form)

a Absolute bed rest until signs and symptoms have cleared

b Douches as above

c Penicillin is much less effecti e in this phase of the disease but a trial of th rapy is warranted (see above)

3 Chronic (chronic gonococcic salpingitis code No 787 103 0)

a Bed rest during acute exa erbations

b Penicillin is u ually ineffecti e

c A course of pelvic diathermy tr atments may be of val e

d Surgical procedures may be indi ted This decision *should be made by a gynecologist Results of surgery* are not uniformly satisfactory

GRANULOMA INGUINALE (code No 146 199)

A chronic contagious disease caused by infection with an organ ism of as yet unproved id ntity and known as the Donovan body *It* is manifested by a painless sharply defined reddish verr cose

and ul erati e easily bl eding, and g anulomatous in tial lesion of the skin or mucous membrane of the genital r gion. If untre ed the lesion gradually e tends to involve the entire genital ar a and late the ad, ce t are a of the abdomen and thighs it rarely in vol s deeper structures There is usually no lymphadenopathy Lesions rarely heal spontaneous y although the process may re ma.n stationary for years Deep tissue scrapings or punch biopsy of lean pe ipheral granulation tissue should be stained with Wright s stain and xamined f r Donovan bodies (see Tab e on page 443)

T treat

1. Aureomycin® and chloramphenicol are both effective 1 Gm daily for 1 2 we ks may be tr ed
2. Streptomy in is highly effecti e but may be contraindicated by the dang r of damage to the estibular appara us If t ied, it m y be used in dose of 1 Gm I M daily until the lesion is healed

LYMPHOGRANULOMA VENEREUM (code No 55 198)
(Lymphogranuloma Inguinale or Lymphopathia Venereum)

Lymphog anuloma venereum is an acute o chronic venereal dis e sused by a spe ific virus It is characterized by minimal herpetif m genital lesions and may be complic ted by regional lymph node invol ement and at tim s by variable constitutional r ior

The incubat on period is unknown (days to months) Initial les ons a e ames ent or unnoticed, herpetiform or ulcerati e and m y appea on any part of the external g nital area Ingural buboes appe r 1 4 w eks aft r inf ction, are oft n bilateral and may or m y not be suppu ative The nod s may fuse soft n and break d wn, f rming m ltiple sinus t acts Extensive scarring may occur Ch on eno ect l d sease manif sted by r ctal pain sanguino purulent discharg and ctal stri tures is mor frequently en ount ed in f male than in ma pat ents Constitutional reactions f quent y ac ompany th stage of bubo format on and are charac ter ed by f ver bitis anorex.a, malaise and neurological mani s stions Consid this dise s as a possibility in undiagnosed we

The F ei his test (bi k embryo ant gen) is of valu If sus picious le ons r of 3 4 weeks du ation a nega ive re tion proba b y rules out lymphogranuloma vener um A positi e skin reaction m mean an active ir ection past (old inf ction, or related viral infec on (also pos tive) Ther may be a reversal of the albumin g obulin r tio in the s rum Complement f xation t sts are of doubt ful value ... the possibility of primary ... (see page 450) F .s positive (usually weakly positive) ... or syphilis may occur

Tre tment

A. ... Therapy

... or sulfathiazole 1 0 Gm. (15 gr) t i d for 3 3 week or long r probably has no e fect against the virus but is effect ve in pr venting secondary complications

2 Aureomycin® 0 25 1 0 Gm (3 3/4 15 gr) orally q i d fo 5 14 days has been reported to be beneficial

B Local Measures

1 Bed rest (provides local comfort)
2 Warm fomentations to buboes p r n for discomfort
3 Analgesics p r n
4 Aspirate fluctuant nodes under aseptic precautions (see below) *Incision and drainage are to be avoided* (to prevent lymphatic obstructions)
5 Proctoscopic examination for diagnosis and for later evaluation of changes
6 Extensive plastic surgical repair operations may be necessary in the chronic ano rectal form of the disease Rectal strictures should be treated by prolonged gentle dilation although in extreme cases this m y be impossible and colon shunting procedures may be necessary

CHANCROID (Soft Chancre)
(Of Penis code No 751 10x) (Of Vulva code No 774 10x)

A venereal disease caused by *Hemophilus ducreyi* and manifested by painful genital ulcer or ulcers often complicated by suppurating inguinal lymph nodes (buboes) Incubation period is from 3 to 5 days (range 2 to 7 days?) following venereal exposure The genital lesion begins as a macule or vesicopustule which ruptur s to produce a shallow necrotic undermined ulcer Single or multiple painful lesions may occur and phimosis may result Regional lymph nodes become enlarged in a few days to 2 weeks and are usually unilateral soft fluctuant and tender The nodes may rupture or may subside spontaneously Giemsa stained smears from the lesion reveal Hemophilus ducreyi which may also be cultured from pus from the lesions of the buboes Syphilis must be excluded by the diagnostic measures outlined under the diagnosis of syphilis (primary) The two diseases may coexist

Treatm nt

A Specif c Therapy

1 Sulfadia ine 1 0 Gm (15 gr) q i d for 1 w ek Observe usual preca tions with the use of sulfonamides (see page 501)

or 2 Aureomycin® or Terramycin® 0 5 Gm every 6 hou s for 5 7 d ys

B Local Ther py

1 Caref l cleansing of ulcerations with soap an l water b i d (after diagno is has been made) will suffi e When lesions fail to heal promptly soaks or compresses of 1 10 000 potassium permanganate s lution m y be necessary
2 Fluct ant buboes may b asp rat d with a larg gauge (No 16) needle as indicat d Warm c mpresses or a hot water bottle may be appli d to the groin f r comfo t and to hasten fluctuation or regr ssion of buboes

Chapter 18

INFECTIOUS DISEASES

DISEASES DUE TO VIRUSES

MEASLES (code No 010 169)

A acute highly comm nicable virus inf ction haracteri d by inflamm tion of the spiratory tract conj ctivitis Koplik s pots and a blotchy r sh

The p ognosis is generally good Secondary infection by ba teri is common but responds r adily to appropriate treatment The f tal y rate of post m asles enc phalitis is 30 per cent and those rviving frequently have residual damage

Di gnosi

The incubation period is 10 days A prodrom l period of fev r oryza and onjuncti iti precede the rash by bout 4 days Koplik s spo sually appear 2 days bef re the rash A blotchy rash appears on the f ce on the fi st day spreads to the trunk on the second and to the xtremiti s on the third and fourth days Leukope is i p s t

Measles i most contagious ju t bef re and d ing the pro drom it rem s cont giou but less so for about a week aft r the appe ranc of the rash

Tre m

A Specif M None vailabl

B Gene l M

1 I o.a f the w k f llowing ons t of rash
2 Bed rest unt l af bri
3 Aspirin a ne e sary f analgesia
4 Salin eye sponge for symptomatic reli f of conjunctivitis
5 \ ponometri tor nos drops
6 Sedat ve cough mixture if nec ry (ee p 111)

C Treatme t of C mp ica on

1 Secondary ba rial infections of the midd. ear throat larynx, or lungs are treated w th appropriate sulfonamides or antibiotic (see 514)
2 Post measl e nc phalitis (code No 033 169) may onl be treated symptoma ica.ly
   Lumba puncture for re..ef of headache p r a
   b A i convu.san s as nec sary (see 351)

Prophylaxis

Active prophylaxis is not practical but passive protection or modification *may be accomplished*

A Complete temporary protection of exposed susceptibles usually follows administration before the sixth day of incubation or *20 cc of convalescent serum 2 to 10 cc* of immune serum globulin (gamma globulin) or 3 to 10 cc of human immune globulin (placental immune) I M

B Modification *of the disease* followed by permanent immunity usually results from the injection of half the above doses on the fifth to seventh days equal doses on the eighth day or double doses on the ninth or tenth days following exposure

RUBELLA (German Measles) (code No 010 165)

Rubella is an acute communicable disease of viral origin characterized by rash and lymphadenopathy

Diagnosis

The incubation period is 2 to 3 weeks A short prodromal period of malaise or aching in the posterior cervical nodes may *precede the fine papular eruption which appears usually first on the* face and quickly spreads to the trunk and extremities Suboccipital and posterior cervical adenitis is usually present Leukopenia is generally noted Patients are probably infectious during the pro drome and during the eruption

T e tment,

A Specific Measures None

B G neral M as s Aspirin for malaise if required

C Treatment of Complications

1 Fetal abno mality is frequently found if the dis ase occurs during the first or early in the second trimester of preg nancy (See Prophylaxis)

2 Encephalitis (code No 930 165) and thrombocytopenic pur pura (code No 516 165 9) are very rare Treat sympto matically

3 Secondary streptococcal infection may occur and should be treated with penicillin (see p 459)

Prophylaxis

Pregna t women who have been exposed to r bella may be given 5 20 cc of immune serum globulin (gamma globulin) I M in an effort to preve t or modify the disease

VARICELLA (Chickenpox) (code No 010 161)

Varicella is an acute communicable disease caused by a virus akin to that of herpes zoster It is characterized by the eruption of crops of *skin lesions*

Diagnosis

The incubation period *is 2 to 3 weeks* (sually 17 days)

Prodromal symptoms are usually slight nd last only one d y Lesions erupt in crops and p ogress th ough the maculopapul r vesicula a d pustula stages to crusts in about 3 days Th e ption is ually centripetal in di trib tion Th pati t is in f tio s for one day befo e the ons t and fo 6 days the eafter The late crusts may also occ ionally be infe tious

Tre tm t
A Specif c M res None available
B Ge l M s
1 Isolate u il primary crusts ha disappe red
2 Bed r st until afebril
3 Cl nliness of skin by freque t tub baths o sh wers when af bril
4 Calamine lotion loc lly and antihistaminic orally may re li e th p u it s
C T tm t of C mplic tions
1 S ondary ba ter l inf tion of the lesions may be tr ated with bacitracin tyrothricin or peni illin oi tm nt locally If ext i e peni illin I M m y be gi en
2 Post vari ella encephalitis may be tre t d only sympto matically

Prophyla i
T mpo ary passi e prote tion i regula ly follows I M admi istration of 20 cc of conval t s rum b t thi is rarely warra ted

SMALLPOX (Variola) (code No 010 176)

Smallpox i s rious omm nicabl febril disease chara ter iz d by rapid onset of constit tional symptoms followed by n eruption most marked on the f and e tremitie and oft involv ing th mucous m mbranes

The prognosi is e trem ly variab, and d pend on ever l f t r Previous effective va cination prev nt o mod ies the infe tion In ca s with high feve and in confl nt and hemo rhagic types of m llpox the progno is i poo The i ul nce of the vi u in p lemi s is quit ri ble If ompli ations are pres e t the prognosis is wo se Th amount of s r i g is variabl but is more marked wi h secondary inf tion

Diagnosi
The nc bation pe iod is 7 t 21 days The p odromal illne last 3 to 4 da s and consists of fever r rem be kache and he d a he p ostration and oft n vomiti g so e throat and cough The onset of the eruption m y be ac ompanied by t mporary d f rvese ence Macul re ucc eded by shotty papu s whi h become ve icles in bout 3 days On bout the sixth day of ruption, pu lation occu s fo ow d by crusting aft the t nth day Lesion are centrifugally d.s ributed and are most d ns on the fa e and distal part of the e trem t s A recent successful vaccination usua ly

Jude the diagnosis of sma..pox in a suspected cas I..ectivity is pre ut from just before the onset unt.l the la t crust is shed

Treatment

A Specific Measures None

B General Meas e Penicillin has a generally favorable effect probably due to control of secondary invaders which are almost an integral part of the disease

C Local Measures

1 Mucous membranes Early in the disease provide good oral hygiene (see p 8) and apply petrolatum or mineral oil swabs to the nares

2 Skin Gentle cleansing If lesions are confluent and sup purating treat as pyoderma (see p 85) Avoid itching by use of antipruritics (see p 68) restraints and sedation may be necessary

D Treatment of Complications Treat as indicated for secondary inf ctions otherwise treatment is symptomatic Complications include secondary infections of the skin mucous membranes and respiratory tract septicemia nephritis myocarditis and various neurological manifestations

Prophylaxis

Vaccination (see p 493)

EPIDEMIC PAROTITIS (Mumps) (code No 621 170)

Mumps is an acute infectious disease caused by a specific virus which most commonly involves the salivary glands but fre quently produces meningoencephalitis orchitis pancreatitis and oophoritis The prognosis is almost always favorable Testicular atrophy usually unilateral may follow orchitis but rarely produces sterility

Diagnosis

The incubation period is 2 to 4 weeks (usually 18 to 21 days) Swelling of the parotid or other salivary glands is the commonest manifestation and is rarely accompanied by severe systemic mani festations Headache and drowsiness abdominal pain and testicu lar pain and swelling usually associated with fever generally denote meningoencephalitis (confirmed by lumbar puncture) pan creatitis and orchitis respectively Complement fixing anti bodies appear d ring convalescence Mumps is p obably infectious just before the appearance of swelling and until swelling disappears

Treatment

A Specific Measures None available

B G ne al Me s re

1 Isolate until swelling is gone
2 Bed rest during febrile period
3 Aspirin or codeine for analgesia if required
4 Alkaline aromatic solution mouth washes
5 Mumps convalescent serum 20 cc mumps convalescent gamma globulin 2 5 cc I M or stilbestrol 2 to 5 mg (1/30 1/12 gr) daily may reduce the incidence of orchitis in adult males

C Treatment of Complications Complications are really less

common manifestations of the dise s and not true ompli tions They may pre de or occ in the ab en of parotitis

1 Meningoenc phalitis (code No 912 170) May be a ymptomatic
   a Analgesics as nece sary
   b Lumbar puncture if necessary to educe headache
2 Orchitis (code No 755 170)
   a Suspension of scrotum in suspensory or toweling bridge and application of ic bags
   b Inci ion of tunica may be necessary in severe c s s
   c Cod in o morphine as ne ssary for nalg sia
   d Inj ction of spermatic cord at xt rnal inguinal ring with 10 to 20 c (2½ 5 d) of 1% procaine s l tion
3 Pa cre titis (code No 690 170) Symptomatic reli f only Parenteral fluid if nece sary
4 Oophoritis (code No 768 170) Symptomatic tre tm t only

Prophylaxis

A M mps convalescent serum 20 cc (5 dr) I M may reduc incidence in expos d s sc ptibl s

B M mps virus vaccine may produce temporary activ immunity Intradermal injection of viru antige d otes immunity if follow d by local erythema

POLIOMYELITIS (Infantile Paralysis) (code No 972 171)

Acute a terior poliomyelitis is an infectious disea e of viral origin involving the central nervous syst m and manif ted by muscle spasm and in ma y case we kness Th ov rall mortality rate is 5 to 10 per c t Almost all d aths oc ur in pati nts with bulbar invol eme t Recovery of motor power is unpredictable and improvement may ontin e fo months or ye rs

Diagnosi

The incubation period is 3 to 21 days (usually 7 to 10 day) Pain is the commonest symptom (h dache backache sti n ck soreness in the extremiti s abdominal pai or sore throat) This is usually associat d with fev r of 3 to 5 days du tion Mus le we kness may ppe r at any time d ring th f b il period The c rebrospinal fluid usually contains a incre ed number of lymphocytes but s ga and hloride cont nt re normal

Infecti ity is great st d ring th fir t week of the d s se and pos bly may be present bef re th onset s j dged from the pres nc of virus in the nasopharynx Virus occasionally persists in the stools f r many weeks

Tre m

A Spe f Mea res None Serum and pla ma have never proved of benef in controlled series

B Gen ral M s res
   1 Pain
      a Hot wool pa ks wrung dry to area of pain d to muscle spasm 2 t 8 tim s da ly
      b Aspirin or codeine s nec ssary fo pain unreLeved by pa ks

2 Muscle spasm Hot packs neostigmine and curare and curare like drugs are of questionable value Muscle stretching after subsidence of the acute process should be carried out cautiously

3 Prevention of deformity and restoration of motor power Weak muscles should be supported by rolled towels sand bags or light removabl splints where necessary to prevent deformity Passive movement to the point of pain of all in volved areas should be carried out daily as soon as fever s bsides to prevent contracture and minimize atrophy As motor power returns active movement of involved areas should be carried out (under careful supervision) once or twice daily to prevent incoordination Pool therapy may allow reeducation of extremely weak muscles by minimizing the effect of gravity Rapid return of motor power usually occurs for about 3 months Following this period an in crease in motor power may develop from exercises against resistance or use in ordinary activities s ch as eating walking and climbing Brac s may be required to support very weak muscles while somewhat stronger muscles are being used actively Canadian (short) c utches and spring suspensio slings for the extremities also may aid in muscle reeducation Complete rehabilit tion within the permanent limitation of the pati t should be attempted so that the patient may res me an approximately normal life as early as possible At all times deformity should be avoided by appropriate supervision

C Treatment of Complications

1 U inary ret ntion req i s epeated cath teriz tion or an indwelling catheter Sulfonamide prophylaxis should be used

2 Pa alysis of deglutition complicated by accumulation of se retions m st be treated vigorously but ar fully to pre vent aspiration ard atelectas s as well as hypoxia Elevation of the foot of the bed and careful r peated aspiration deep in the respiratory t act with me hanic l suction sho ld be utilized primarily When these measures are unsu cessful tra heotomy should be perfo med and suction carried o t through the tracheotomy opening Penicillin should be used to preve t secondary infection

3 Paralysis of int cost l muscles and diaph agm requ res th use of the respi ator Attempt to wean the pat ent away from the respi tor should be beg n as soon as any r spira tory involvement is observed and should b persisted in at whatever pace is possible The rocking b d nd chest res pirator should aid in the transition If the nitial capacity diminishes or fails to i crea e return to more mechanical respiratory aid may be ne essary t avoid fatig e of weak respirato y mu cles

Oxygen may be given by nasal cath t r or ma k wh re hypoxia is evid nt by cl nical observat on r o imeter ead ings The negative pressure of the respi ator and the rate of respiration sho ld be adjusted ac ording to n ed b t should be the mi imum requi ed to i s re adeq t oxygen ation

4 Resp ratory center involvement (acut bulba polioenceph alitis code No 957 171) Patients whose respirato y

diffi ulty i d e to involvement of the re piratory ce ter are generally not helped by the respirat r Oxyge should be admini tered to p e ent hypoxia

5. Cardiovas lar Hypert nsion hypot sion and ta hycardia m y oc u d e to i ol ment of circulatory ente s by poliomyelitis irus or hypoxi damage Tre tment is un s tisfactory Oxyg n should be used
6. Atel ctasis and pn umonia re fr qu nt c uses of death in patients with r spiratory paralysis nd may be avoided by spirati n or bronchos opy d antiba teri l therapy

P ophylaxi

T highly controversial subject at pres t

A. Gamma Glob li Gi en in doses of 0 2 cc pe pound of body w ight gamma globuli is st t d to be 88 per ce t ff ctive against paralyti ffect of disease f a 5 w ek period and 75 per ent eff ti e f r p to 8 w eks (W M Hammon) Evi d nc would s ggest that gamma globulin may have preventi e o modifying effects e e whe gi en in an inc bation period

B. Salk Vac in A nationwid ont olled vaccination program c ly in progress will indi ate the value of thi vac ine

PSITTACOSIS (code No 010 173)

Psittacosis (ornithosis) is characteri ed by pn umonitis oft n migrati g usually associ ted with ve e to mia A history of ont t wi h pa ot pa akeets pigeon or rarely other birds is ually obta nabl Diagnosis is prov d by is lation of viru from blood or sput m of th pati t o by risi g tit r of compl m nt f i g antibod s H man to h ma tran f r is r e although iso lation precaution re wi e

Tre m t

A. Spe i M s
   1. Chl y i ne (A reomycin®) 0 5 Gm e y 6 hour orally or 0 5 Gm I V every 12 ho rs for 10 to 14 days
   - or 2. P ni illin (queou) 100 000 units I M every 3 hou s for 2 weeks
   - or 3. Oxytetra ycl ne (T rramycin®) 0 5 Gm every 6 hou s orally

B. General M a re Oxyge and s dation as req ired

ENCEPHALITIS (code No 930 1)

En phali may be arthropod borne (East rn nd W rn ... ne phalomyel. St Loui or Japanese B) post infectious (... vac inia et) o of a known type (von E onomo s etc) Sensorial depre ion neu logi al abnormalities signs of m nin geal i ritation and convu ions may be not d Lymphocyt sis is found i the c rebrospinal fluid and ociated with de re s of sugar ... P ang t r of om ... ing ... the arthropod borne types and in ... encephalomyelitis

Treatment
A Specific Measures None
B G eral M sures
1 Repeated lumbar punctures may relieve symptoms
2 Prevention of decubiti pneumonia and urinary tract infec tions is important
3 Anticonvulsants as needed (see pp 351 and 533)

LYMPHOCYTIC CHORIOMENINGITIS (code No 910 160)

Lymphocytic choriomeningitis is a viral infection of the central nervous system which is clinically indistinguishable from non paralytic *poliomyelitis or mild encephalitis* The virus may be iso lated from the blood or spinal fluid or diagnosis may be confirmed by a rising titer of neutralizi g or complement fixing antibodies
Incubation period is probably 8 to 21 days

Tre tment
A Specific Measures None
B G n ral Mea res As in encephalitis (see above)

DENGUE (code No 010 162)

Dengue is an acute infectious disease ca sed by a virus trans mitted by mosquitoes The incubation period is sually 5 to 8 days following the bite of an infected Aedes mosquito Onset is with chilliness aching of head back and extremities anorexia and severe prostration Conjunctival injection and generalized lymph adenopathy may be found The fever usually lasts 5 to 6 d ys and may be of the saddle back form A scarlatiniform or maculo papular er ption occurs on the third to fifth d ys and lasts up to 3 days Leukop nia is us ally marked Fatality is extremely rare

Treatment
A Specific M asur s None
B C n al Meas e
1 Salicylates or codeine as required for discomfort
2 Gradual restoration of activity during prolonged convales cence

Prophylaxis
A Control of mosquitoes by screening and DDT
B Dengue vaccine shows promise experimentally

RABIES (code No 010 174)

Rabies is an acute viral infection primarily of animals which *is* occasionally transmitted to man It is characterized by apathy or hyperexcitability paralysis and invariably results in death

Diagnosis
The incubation period *is us ally 2 to 8 weeks* (occasionally as

long as 1 y r) f Lowing the bit of a rabid animal Onset occ s with pain and n mbn ss at the sit of 1 oc lati n followed by de pres ion irritability nd mild dy phagia This is followed by hyperes he ia and m scl spasms partic larly of the pharynx E entually paralysis and death occur

Tr tm t

A Specifi Therapy Non

B C TM

1 Absol t qui t and fr dom from stimulatio

2 Sedation as in teta us for preventing convulsions

Proph laxis

A Co rv tion of nimal producing bit

B Ca t rization of wound with f ming nitric a id followed by n trali ation of th a id with lime wat r or tho o gh w shing with green soap

C Rabi s accine 2 cc subc t daily f r 14 days following posi tiv diagnosis of rabies or following bite by a s spected animal if a im l cannot be obs rved or if bite is on the head

YELLOW FEVER (code No 010 178)

Y llow fever is an te infection of man nd monk ys due to a vir tran mitt d by A des mosquitoes It is characteriz d by f ver r lativ bradycardi ict ru and hemorrhagi ph nomena The m rtal ty rate of y llow f e is q it v ri ble Including mi ed it is probably 5 per ce t

Di gnosi

The incubation period is 3 to 6 days The on t is with chill he da he and ba kache Th f er oft de lines t mporarily aft 3 days during which tim th patient i f hed and toxic and may have s vere na se and vomiting The conjunctiva are inject d and the tongue red Thi is follow d by pallor c hymos s bl di g g m black omit l ght jaund mel na albuminuria and prostra ion Le kope ia nd relative bradyc rdia a e usually s en

Tre tme

A Spec I Tre tm nt None

B Gene l M

1 Liqu d d t Limit food to high-carbohydrat high prot i liquids n io, rat d

2 Intravenous g ose and saline as r quired

3 Analgesi and sedatives as ne ssary

4 Saline enemas for ob pat on

Proph a s

A M o quito ontrol by adequate creening use of DDT ... hed

B Y ow f ver va ine 0 5 c subc neou ly

DISEASES DUE TO RICKETTSIAE

The rick ttsiae are arthropod borne organisms which produce widespread nodular thrombotic and necrotic lesions in the smaller blood vessels and capillaries The severity of involvement varies with the different species of the rickettsi e The seriousness of the prognoses of epidemic typhus Rocky Mountain spotted fe er and scrub typhus has been greatly reduced since the advent of specific antibiotic therapy

Diagnosis

A ypl s Fever (code No 010 184) Incubation period 6 to 15 days *Typh s fever is caus d by Rickettsia prowazeki (epi* demic type) or Rickettsia mooseri (*murine type*) *The former* is transmitted by body lice the latter by rat fleas The dis eases are similar except that the murine variety is less severe Onset is abrupt with chills fever aching and prostration Delirium stupor or coma may occu A macular papular or hemorrhagic rash begins on the fo rth to seventh days *appearing first on the trunk and spreading to the extremities* sually sparing the face palms and soles Leukopenia occ rs ea ly Diagnosis may be confi med by complement fixation reaction or Proteus OX 19 agglutinins appearing during the second week

B Rocky Mountain Spotted Fever (od No 010 181) The incu batio period is 3 to 14 days Rocky Mountain spotted fever is caused by Rickettsia ick ttsi and is *transmitted* by tick bite (principally Derma entor andersoni and D variabilis) Pro dromal symptoms of chilliness anorexia and malaise may occur The onset of chills fe er headache photophobia pain in the extremiti s is usually s dden A red later dusky or hemorrhagic maculopapular rash appears first on the wrists and ankles from the second to sixth days and extends rapidly over the entire body includ ng the face palms and soles Leukopenia is usually p ese t early Complement fixing antibodies and agglutinins for Proteus OX 2 or OX 19 appear during the second week

C Scr b Typhus (Tsutsugamushi Fever) (code No 010 183) S r b typh s is c u ed by R ckettsia o i ntalis (R tsutsu gamushi) and is transmitted by larval mit s An eschar at the area of inoculation is common The onset is sudden with chills fever malaise and cough A d ll red maculopapular erupt on appears on the trunk from the fifth to eighth days and may ex tend to the extremities Specific complement fixing antibodies or I roteus OX K agglutinins appea during the seco d week

D Q Feve (code No 010 185) Q fe er is caus d by Coxiell bu n ti and is apparently acquired from sheep goats and cattle in a manner not yet det rmined H adache fever cough and stiff neck are common symptoms Repeated rigors may occur Pneumonitis or hepatitis may be d monstrated Specific complem nt fixing a tibodies appear during the second or third weeks

E Rickettsi lpox (code No 010 187) Ri k ttsialpox is an infec tion caused by Rick ttsia akari introduced by the bite of a mite A lesion which passes through the stage of p p le vesicle and

es har pre des the o t of fev r chills h adache ph to phobi and muscula soreness by about a w ek A generalized ra h which evolves through papular sicular and crusting stag s ppears at the onset of fever or a few days later Le k penia usually is present

Tre tm t
A Spe f M sur s
1 All k i s [d seases
a Chlort iracycli (Aureomy i ®) 0 5 1 0 Gm orally very 6 hours for 2 to 7 days r 0 5 Gm I V every 12 hours
or b Oxytetracycline (Terramycin®) 0 5 Gm orally ev ry 6 hours for 2 to 7 days or 1 Gm I V every 12 hou s
or c Chl ramph nic l U S P (Chl romycetin®) 0 5 Gm orally every 6 hours for 2 to 7 day
or 2 Typhus nd Rocky Mountain spott d f ers Par amino benzoic acid 1 0 2 2 Gm /Kg body wt (0 5 1 0 Gm /lb) orally per d y in divid d do es every 4 hours for s eral days aft r cess tion of f er (for typhus and Rocky Mountain spotted f vers)
B Ge ral M res
1 P ent ral fl ds oxyge and sedation s req ired
2 Othe s pporti measu es as needed
3 Delousing proc dures m st be c rried out f r louse borne inf tions (e p 93)

Proph la is
A Spe f M s s
1 Typ ne (Co type) 1 cc subc t twi e at 7 to 10 day interval
2 Rocky Mount in spotted fever va cine 1 0 c subcut 3 tim s at 5 to 7 day intervals
B General M Delou i g is very important in louse borne m mic typh (s p 93)

DISEASES DUE TO BACTERIA

SCARLET FEVER (code No 010 102) and STREPTOCOCCIC SORE THROAT (code No. 631 102)

Sc let f ver and streptococcic sore throat (follicula tonsil lt s septic ore throat) are infections of the f s by β hemo lytic s reptococci (Lanc fi d Group A) In scarlet f ver in addi tion rtain man_estation due to erythrogenic toxin are present

The mortality rat from streptococci sore throat and c rl t fever is the Unit d Stat is 0 5% or l s Rhe matic fever is pro bably more common than general y appre iated and may be appa nt only when serial lectroca diograms are tak n d ring conva lescence

Diagnosis

The incubation period is 2 to 7 days The onset is usually abrupt with chills fever headache pain in the extremities or abdo men vomiting and sore throat The throat is usually fiery red and moderately edematous Exudate if present consists of patches of whitish material which may be easily wiped off The rash of scarlet fever consists of a punctate erythema which is densest in the skin folds of the axilla and groin but does not appear on the ex tensor surfaces of the upper extremity Strawberry tongue and stippling of the soft palate may be noted Diagnosis may be con firmed by culture Sedimentation rate is increased and leukocytosis is present

The duration of the infection varies it may be prolonged by a convalescent carrier state

Treatm nt

A Specific Measures

1 I enicillin p ocaine 300 000 units daily I M Penicillin must be continued 5 to 7 days or relapse may occur Aque ous penicillin 30 000 to 40 000 units I M every 2 hours may be used or oral penicillin 200 000 units every 6 ho rs Local penicillin by lozenges is worthless

or 2 Chlortetracycline (Aureomycin®) 0 2 0 5 Gm every 6 *hours oxytetracycline (Terramycin®) 0 5 Gm every 6* hours or erythromycin 0 2 0 5 Gm every 6 hours are effective but may be followed by bacteriological or clinical relapse

3 Sulfonamides have no effect on the course of streptococcic sore thrcat or scarlet fever but may prevent complications if given for 2 weeks Dosage 0 5 Gm (7½ gr) every 4 hours with equal or double q antities of sodium bicarbonate

4 Scarlet Fever Streptococcus Antitoxin (9 000 36 000 units) may be given I M with benefit in severely toxic cases of scarlet fever

5 Convalescent serum 25 to 150 cc (1 5 oz) may be used *similarly to antitoxin and may be given I V*

B G neral Measur s

1 Bed rest until afebrile and sedimentation rate is normal

2 Diet as suited to soreness of throat

3 Hot saline or 30% glucose gargl s or throat irrigations 3 or 4 times daily for relief of sore throat

4 Aspirin or codeine as necessary for symptomatic relief

C Treatment of Complic t ons

1 Complications due to infection include cervical adenitis rhinitis sinusitis otitis mastoiditis pneumonia empyema septic arthritis and septicemia Treatment with penicillin is usually effective (see p 502)

2 Complications of unknown etiology

a Rheumatic fever may be prevented by early vigo o s treatment of the infection with penicillin (see p 518)

b Acute hemorrhagic glomerulonephritis (see p 293)

D Treatment of Carriers 300 000 units of penicillin p ocaine complex daily I M for 6 days usually abolishes the carrier state

Prophyla is

A Sc T f lev r toxin in 5 w ekly i jections of 300 2000 8000 25 000 and 80 000 unit s bc t pre ts the toxic manifes tations of s s let f r b t does ot pr e t streptococcal in fection

B S lfonamides 0 5 Gm (7½ gr) b i d penicillin 100 000 units by mouth b i d or benzathacil penicillin 600 000 un ts I M once a month reduce the incid nce of st ptococcal in fection These should be reserved for ind vid als with rh matic l sions to preve t recu re ce of rhe m tic fever

DIPHTHERIA (Pharyngeal code No 631 125)
(Laryngeal code No 330 125)
(Nasopharyngeal code No 318 125)

Diphtheria is an a ute inf ctious dise se ca d by Coryn bac t rium diphtheriae nd cha teri ed by th format on of pseudo m mbra e at the portal of e try usually the re piratory tract and by the cti ity of e otoxi at dista t sit s

The mortal ty rat of diphtheri generally varies between 10 and 20 pe cent olde individuals do poorly and d lay of tre tment arri s with it high mortality rat Myoc ditis appe ing rly is freque tly f tal and d turbances of cond tion or the ppear ance of rapid a hythmias imply a relati ly poor progn i How eve if the pati t survive re overy i s lly complete

N i is is rarely fat l nless pne moni compli at s paralys of cranial nerves r unle s inte costal muscles are paralyzed Su vi ing pati t r over slowly but omplet ly

D agn i

The i cubation period i 2 to 7 days Symptoms d pend on the site of the lesion but incl d sore throat nasal disch rge or hoa s s acc mpanied by malaise and low grade f ver The p eudomembrane i typically greyish homoge eous a d tenacious Edema and na row zone of yth ma aro nd the lesion are usually found Diagnosis is confirmed by c ltures Inf tio s ess must be ass med as long a C diphth riae pe sists in the nasopharynx the carri r state is not uncommon

T m t

A Spec f M s re

1 Diphthe t xin must be gi n in all ca es where d ph the ia c nnot be e luded by simple clinical examination The i travenou rou is preferable in ll exc pt the mildest cas s or in those who are s n iti e to horse s rum Con junc i l and k tests for s um s nsitivity (see p 494) hould be done i all c se nd d n itization (s p 494) ried ou if nec ary The dose vari s with th d ration of the dise se t e loc tion of th lesion and th si e of th pa ent A sing e dose hould suffic

DOSE SCHEDULE

Location	Child	Adult
A terior nasal	5000 units	10,000 nits
Mild pharyng al	10,000 nits	20,000 units
Mod r te pharyng l	20 000 units	40,000 nits
Severe pharyngeal and nasopharyngeal	40 000 units	80 000 units
Laryngeal	10,000 nits	20 000 units
Any two sites or late cases	40 000 units	80 000 units

2 Penicillin procaine 300 000 units daily or penicillin 50 000 units every 3 hours accelerates slightly the disap pearance of the organism from the throat and acts against secondary streptococcal invaders it does not alter the course of the diphtheria itself

B C n ral Me a es

1 Absolute bed rest for at least 3 weeks and until Ecg is normal
2 Liquid to soft diet as tolerated
3 Hot saline or 30% glucose throat irrigations 3 o 4 times daily
4 Aspirin or codeine as required for pain

C T eatment of Complications

1 Myocarditis (code No 430 125 9) This may occur at any time up to several weeks after onset and may be associat d with peripheral vas ular collaps Anginal or abdominal pain naus a and vomiting or syncope may be noted Dete rioration of the mitral first heart so nd drop in blood pres sure gallop rhythm or any arrhythmia may be found Ecg evidence is usually demonstrated in serial records
   a No definitive t eatment is known
   b Oxygen by tent or mask may be needed
   c Hypertonic glucose solution 100 cc of 20% solution daily may aid
   d Digitalis and quinidine should be reserved for rapid arrhythmi s
2 Neuritis (code No 98 125 9) gen rally does not begin until at least 3 weeks after the onset Nasal voice regurgitation of fluids through the nose (N IX) paralysis of accommodation (N III) dysphagia and dysphonia (N X) and rarely involve ment of other cranial nerves usually precede involvement of the extremities which is associated with paresthesias weak ness a d depression of reflexes Nasal feeding should be attempted in s ch cases Corrective splinting and physi al therapy may be of aid
3 Respiratory tra t obstruction Cro py co gh stridor and dyspnea suggest laryngeal obstruction
   a Suction of membrane and secretions under di ect laryngo scopy may help
   b Intubation or tracheotomy should be perfo med before the appearance of cyanosis if the distress incr ases

D Treatment of Carriers Penicillin has very limited effect on the carrier state

Prophylaxi

A Childre Three inj tions (0 5 1 0 and 1 0 cc) of diphth ria toxoid (formol alum o aluminum hydroxide pre ipitated) at one month intervals during the s ond 6 months of life (may be combined with tetanus toxoid nd pertus is vaccines) Follow by Schick test in 3 to 6 months Give 1 0 cc booster at 2 years and at start of school

B Adults

1 Sen itivity test Maloney's test f r nsitivity to t oid 0 1 cc of 1 20 dilution of plain toxoid intr dermally R ad like Schick test at 24 to 48 hours

2 If Maloney t st is n gativ proc ed a in child en

3 If Maloney test is positive give 0 1 c of 1 10 dil tion of formol toxoid intrac tan ously at 3 w k intervals

PERTUSSIS (Whooping Cough) (code No 350 108)

P rt si is an acute communicabl infection of the respiratory tract It i ca sed by H mophilus pe t s and is characte i d by paro ysmal cough whoop nd ab lut lymphocyt si Until rec tly the mortality rat of pert ssis in infa ts und r one year of age whe the dis s is mo t common was 20 per ce t This has be n materi lly reduced with modern a tiba t rial th rapy Older children rarely die of pert ssis

Di gnosi

The inc bation period is 7 to 14 days The ons t is with coryza follow d by gradually increasing cough After 1 to 2 w ks the ough be om s paroxysmal especially at night and is oft n follow d by omiting Whoops may be heard d ring the paroxysm but ar often be t o infrequent in young infants Ab olute lymphocytosis ap pea d ri g the paro ysmal stage The diagnosis may be onfirm ed by cough plat or nasopharynge l swab cultured on Bo d t Ge gou s medi m Inf ti n ne s is gre test arly in the di ease nd decr a es until the organisms di ppea from the nasopharynx ft r about one month

Treatm nt

A Spe ifi M

1 An b otic

a Chlort t ycli e (Aureomycin®) 25 mg /Kg (11 mg /lb) per day orally

o b Oxytetra ycline (Te ramycin®) 50 mg /Kg (23 mg /lb) pe day orally

or Strept mycin 1 0 Gm pe day in divided dos s I M f one we k may be effective

d Chloramphe i ol U S P (Ch oromyc t ®) 50 mg /Kg (23 mg /lb) per day or lly

o Polym xi 2 0 mg /Kg (1 mg /lb) pe day I M is al o prom isi g but this d g may be too tox (ee p 510)

2 Hype immune serum or hype mmune gamma g obuli ap pea t ha recovery preve t comp icat ons and reduce mortal ty 22 hyperimmune s m or 2 5 cc hype immune gamma g obuli s given daily or every othe day I M f 4 or 5 dos

C Complications and Treatment
1 Myocarditis and renal failure are *common in severe cases* No specific treatment is available
2 Cranial nerve lesions (especially N VIII) are usually per manent
3 Arthritis requires no treatment other than paracentesis for relief of pain

Prophylaxis
A total of 1 0 2 0 Gm (15 30 gr) sulfadiazine orally to ex posed persons or carriers in two doses taken the same day

PNEUMOCOCCIC MENINGITIS (code No 910 101)
STREPTOCOCCIC MENINGITIS (code No 910 102)
STAPHYLOCOCCIC MENINGITIS (code No 910 105)

Symptoms are similar to those of meningococcic meningitis but a preceding infection is usually present and a focus is often de monstrable in the lungs (pneumococcic) the middle ear or sinuses The spinal fluid must be cultured and examined to determi e the causativ agent

T eatm nt
A Specific Measures
1 Treat as m ningococcic meningitis (see above) and also *give 10 000 units of penicillin in 10 cc physiological saline* intrathecally once daily until CSF glucose is normal
or 2 Aqueous penicillin 1 000 000 units I M every 2 hours
3 Erythromycin 0 5 Gm every 6 hours for staphylococcic meningitis
4 Oxytetracycline (Terramycin®) a d chlortetracycline (Aureo mycin®) may also be effective do not combine with penicillin
B Ge ral Measures Symptomatic and suppo tive

HEMOPHILUS INFLUENZAE MENINGITIS (code No 910 110)

This form of meningitis may d velop gradually or sudd nly It usually occurs in infants less than 2 years old The symptoms are similar to those of any purulent meningitis (see p 465)

T eatment
A Specif c M asures
1 D hydrost eptomycin (adults 1 0 Gm children 250 mg) I M every 6 hours for one week and streptomycin 25 mg in 10 cc physiologi al alin solut on intrathecally daily until cerebrospinal fl id glucose content is normal
2 Severe cases should also be given sulfadiazine sulfamera zine or a mixture of equal pa ts of each 150 mg /Kg body wt (65 mg or 1 gr /lb) per day Give equal or double *doses of sodium bicarbonate*
3 Hemophilus influenzae antiserum (Type B) should also be given to patients with delayed response 25 to 100 mg of antibody nitrogen daily I V until s rum produces quellung reaction

4 Chlort tracycline (Aureomycin®) 0 5 Gm e ery 6 hou s is of valu Oxyt tracyclin (Terramycin®) and chloramph n i ol U S P (Chl romycetin®) are also effectiv

B Ge ral Meas es T eat symptoms as th y arise and main tain good n trition nd adequate fluids

TUBERCULOUS MENINGITIS
(Leptomeningitis code No 912 123)
(Pachymeningitis code No 911 123)

This dis ase is caused by spread of the tubercle bacilli from a focus usually in the lungs o in the peritracheal peribronchial or m se teric lymph nodes There is usually a gradual onset of symp toms with listl ss ess irritability anorexia and fever followed by headach omiting night cri s convulsions and rigid ty of the k opisthotonos paralysis and coma

Cerebrospinal fl id frequently xanthoch omic is under in rea d pr sure and on standing may form a web and pellicle from wh h o ganism may be demonstrat d by sm ar cultu or guinea pig i oculation Cells and protein are increased but sugar and chl ride are de re a d

Tre m t

A Spe if M as res

1 Strep omy in 30 mg /Kg body wt and dihydrostrepto mycin 30 mg /Kg body wt per day I M in di ided dos s very 6 to 12 hours for 5 months

and 2 Streptomy in 2 mg /Kg of body wt (1 mg /lb) intrathe cally daily for 2 we ks every other day for 2 we ks and twice a w k for 2 weeks

and 3 P ra aminosalicylic a id 3 to 4 Gm every 6 hours by mouth or sod um para aminosali y ate 15 to 30 Gm da ly I V for one y ar

nd 4 Isonicot ni id hydrazide (Isoniazid INH) 3 mg /Kg body wt pe day di ided into 2 or 4 dos s for on y r

B Gene l M res Tre t symptoms as th y a ise and maintain good nutrition and adequate fluids

TYPHOID FEVER (code No 010 115)

Typhoid f r i an inf ction au d by Eberth lla typhosa and hara t riz d by ba teremia ulceration of th lymphoid t ss e of the sma l intestine and generalized to mia The morta ity of typhoid f ver vari s from 5 to 25% Fid ly individuals do poorly

D gnos

Inc ba ion period is 3 to 14 days A gradual ons t of f r and malaise often associated with cough or ep staxis is follow d by a period of 2 or more we ks of sustained f nd then gradual de f ever ne Rose spots r nom galy re a ve bradycardia direct t pulse and pe oup stools m y be noted Leukopenia is the rule Isola ion of the organi m from the blood stool or urine or a high or rising titer of agglutinins confirms the diagnosis

or 2 Chlortetracycline (Aureomycin®) orally Give 50 mg once the first day 50 mg twice the second day 50 mg 3 times the third day and 0 5 to 1 0 Gm every 6 hours for the following 12 to 14 days Small initial dosage avoids Herxheimer like reaction

or 3 Chloramphenicol U S P (Chloromycetin®) 60 mg /Kg body wt (27 mg /lb) orally initially then 0 25 Gm every 3 hours until afebrile 7 days

or 4 Oxytetracycline (Terramycin®) 0 5 Gm every 6 hours

or 5 Dihydrostreptomycin 0 5 Gm I M every 6 hours for 2 weeks and sulfadiazine sulfamerazine mixture 3 Gm (45 gr) initially and 1 0 Gm (15 gr) every 6 hours for 2 to 3 weeks

B General Meas res
1 Bed rest during acute febrile stage
2 High vitamin intake

Prophylaxis
A Destruction of infected dairy animals and immunization of susceptible animals
B Pasteurization of all milk and milk products

GAS GANGRENE (code No 12)

Gas gangrene due to any of several anaerobic Clostridia is an occasional complicating infection of wounds which are soiled with dirt or feces Devitalization of tissue is usually present Fever chills and local swelling are usually seen Gas bubbles in the tissues may be demonstrated by x rays Bacterem a may be present Anaerobic cultures of discharge from the wound or blood confirm the diagnosis

Treatment
A Specific M asures
1 Penicillin 100 000 units I M every 3 hours
and 2 Polyvalent gas gangrene antitoxin 20 000 units at once and repeat every 6 to 8 hours
and 3 Full doses of sulfadiazine sulfamerazine mixture (see p 493)
B Surgi al Measures Adequate surgical debridement and ex posure of infected areas

TETANUS (code No 010 11x)

Tetanus is a nervous system intoxication caused by fixation of Clostridium tetani toxin which enters through an op n wound and infects injured tissues the disease is characterized by tonic con tractures of striated muscle

Diagnosis
The incubation p riod is 5 days to 5 weeks The first symp toms usually are pain and tingling at the site of inoculation which may be an insignificant wound that has become contaminated with

II This is follow d by i itability trismus stiff neck and ex i mili s and spasm of the abdominal muscles Rigidity of m scles i us sardonicus stiff neck rigid abdominal muscles and hypera tive r flex s are found T nic convulsions gr d ally ppea and are pre ipitat d by slight stimulat on Feve s variable De h sually occu s f om a phyxia or pn umoni The mo tality rate of t ta us is approx.m tely 40% A long incubation period and the d lay d appearanc of t tanic convul ions are fa orable signs

Trea m t

A Spe fi M s a T tanus antitoxin 60 000 units I V

B Sf I M res

1 Abs lute quiet with minimum stimulation

2 A ti-convulsant drugs

T bromoethan l U S P 15 to 25 mg /Kg body wt (1/6 1/6 gr /lb) re tally e ery 1 to 4 hours as required to pre nt onvulsi ns

b Sod um Amytal® 5 mg /Kg of body wt (1/32 gr /lb) I M s equir d

Parald hyde 4 to 8 c orally or 10 to 40 c rectally

p n

3 C ra in il and bee wax shows expe im tal p omise but not y t tablish d

4 M phen si (Tolserol®) 1 to 3 Gm orally or 1 to 2 Gm I V (2) 3% sol tion) may be omb ned with ba b t rates

5 Intra no fl id as requi ed

Prop la

A T ta s tox d i c n 3 d s s at 3 t 4 week intervals i d by boo te of) t one y nd l c t time of

B T ta y antit x n 6000 unit I M in individuals ha ing so i on m na d ound specially pu cture wounds ompo nd fract and powd burns

C Ad qua deb id ment of wounds

BOTULISM (code No 010 120)

Bot l m s food poisoni g a sed b the i gestion of p e formed t x of Clost idium bot inum d chara t riz d by in volvem nt of the ntral nervous system pecially the bulba reg n The m rtality of botul m is 60 pe t death occur i g is from 31 hou s to 10 day

Sy ptom

1 S ms appea 18 to 36 hou s a e the ingestion of imp oper ly e d food ually home -canned Weakness vertig Co tip on dysphagia ad dy honia are u ually noted ia not prominent Sympt ms are generally slight o be nt and fever ve 4 De th a e s from resp atory f ilure o pn monia

T

A Spe i c M re Botul us a t t x Types A nd B as t M s soon as possible

rest for one week should be continued for prolonged periods. Hemolytic anemia should be guarded against by freq ent blood counts

or C Isonicotinic acid hydrazide (isoniazid INH) 5 mg /Kg bod wt per day in 3 or 4 doses

DISEASES DUE TO SPIROCHETES

RELAPSING FEVER
(Louse borne code No 010 1411)
(Tick borne code No 010 1412)

Relapsing fever is characterized by recurring febrile episodes of 3 to 5 days d ration following a bite by an infected tick or louse Diagnosis may be confirmed by demonstration of Borrelia recur rentis in the blood on direct examination or by animal inoculation

Tr atment,

A Specific Measur

1 Penicillin 50 000 units I M every 3 hours or penicillin procaine 300 000 units I M daily for 10 days

or 2 Chlortetracycline (Aureomycin®) 0 5 Gm e ery 6 hours orally

or 3 Chloramphenicol U S I (Chloromycetin®) or oxytetracycline (Terramycin®) may be expected to prove effective

B Supportive and symptom tic measures as n eded

SPIROCHETAL JAUNDICE (Weil s Disease) (code No 010 142)

Spirochetal jaundice is characterized by severe constitutional symptoms purpuric skin lesions jaundice and nephritis A history of contact with rats may be obtained (e g s wer workers warehousemen) Dark field examination of the blood or urine r vealing the Leptospira icterohaemorrhagiae or a high titer of specific agglutinins confirms the diagnosis

Treatment

A Specific Measures

1 Chlo tetracycline (Aureomycin®) 0 5 Gm orally every 6 hours

or 2 Penicillin 100 000 units every 3 hours I M

B Supportive and symptomatic measures as indicated

RAT BITE FEVER (Sodoku) (code No 010 134)

Rat bite fever is caused by Spirillum minus and is character ized by a recurrent chancre at the site of inoculation accompanied by regional adenitis fever and a macular rash The fever is episodic and recurrent

Treatment

A Specific M asures

1 Penicillin 100 000 units every 3 hours I M or penicillin procaine 300 000 units I M every 12 hours
o 2 Chlo tetra ycline (Au omycin®) 0 5 Gm every 6 hours
B S ppo tive and symptomatic measures as indicated

YAWS (Frambesia) (code No 010 146)

Yaws is an infectious d sease produced by Trepor ma pert nue and chara t ris d by granu omatous lesions of skin mucous membranes and bone Yaws is rarely fatal

D agnosis
Y ws is acquired by direct non enereal contact The mother yaw s painless papu e whi h later ulcerates appears 3 to 4 weeks aft r xposure S x to 12 weeks later similar secondary l s ons appear and last for s veral months o years Late gummatous l sions may f llow Vis e al involvement is rare Th Wass r mann and floc ulation t ts are positive and the spiroch tes may be d mons ated by dark field examination

Treatment
A Spe if ea s
1 Peni illin procaine 300 0 0 units I M daily for 7 to 10 days
o 2 Chl tetra ycline (Aureomycin®) 0 5 Gm ev ry 6 hours for 10 days
o 3 Dichl rph nars ne 40 mg I V w ekly for 3 to 8 weeks
B General M asures Clea liness of l sions is of utmos im portance

Prophylax
None other than good hygiene

INFECTIOUS DISEASES OF UNDETERMINED ETIOLOGY

VINCENT S ANGINA (Stomatitis) (code No 610 141)

Vincent s angina is an ulcerative infection of the oropharynx of doubtful tiology Fusiform a d spirochete infection and herpes sor s virus have been incriminated

Treatment
A Spe M asure (Probably against se ondary infection)
1 Peni illin troch 5000 un t to be sucked constantly
2 Penicillin p ocaine 300 000 units daily I M In severe cases
o 3 Chlort tracyc ine (A reomycin®) chlo amphen col (Chloromy etin®) or oxytetracy line (T rramycin®) may reduc secondary inf ct on (se pp 507 510)
B Gen al M s res
1 Sodium perbora or hydrogen peroxide mouth washes
2 Correction of oral hyg ne by a dentist

6 X rays may reveal alteration of contour of diaphragm hepatomegaly or right lower chest invomvement
7 Material (anchovy paste like) may at times be aspirated from carefully localized abscess mass
8 Complement fixation test may help confirm diagnosis

C Amebiasis of Other Organs Diagnosis is difficult and is pos sible only by maintaining a high index of suspicion of specific organ involvement (based on clinical manifestations) in patients with known or suspected amebiasis

D Asymptomatic Amebiasis This diagnosis must be reserved for cases in which routine stool examination reveal cysts of E histolytica b t clinical findings (including sigmoidoscopic ex amination) are completely negative

E Therapeutic Test A therapeutic trial of anti amebic drugs particularly chloroquine or emetine may be warranted
1 If diagnosis is doubtful after careful investigation and amebiasis (especially hepatic) is clinically suspected
2 *If fulminant diarrhea is present and diagnosis is clinically suspected but cannot be established and no other organism can be found*

Treatment

A General M asures
1 Report case to local health authorities
2 Bed rest is required for certain patients those with frank dysentery hepatic or other non enteric involvement and *all patients receiving emetine therapy* (See below)
3 Diet
a If diarrhea is present follow the dietary measures as outlined for nonspecific diarrhea (see p 258)
b *If there is hepatic disease* follow the dietary measures outlined under the management of chronic hepatic dis ease (see p 280)
c Iron salts should be given if anemia is present (see p 219)

B Acute or Chronic Amebic Dysentery
1 Specific drugs In the presence of dysentery *it is* probably safer to assume that organisms have invaded extra intestinal tissues With this in mind an adequa e course of therapy should include not only an agent effective against intestinal forms but also a drug which is effective in the extra intestinal tissues (see table below)

Effectiveness of Anti amebic Drugs

	Against Intestinal Organisms	Against Ext a intestinal Organisms
Chloroquine	±	+
Emetine	±	+
Carbarsone and Milibi ®	+	
Vioform®	+	
Erythromycin	+	±
Fumagillin	+	±

Combinations of chloroquine (or em tine) and an arsenical (Carbar one or Milibis®) o an iodine-containing compound (Vioform®) are commonly employed If the organisms prov resistant erythromycin or f magillin c n be tried Dosages are gi en below

a Chlo oquine Diphosphate U S P 0 5 Gm ($7\frac{1}{2}$ gr) (or 0 3 Gm of the bas) b i d fo 2 days followed by 0 5 Gm ($7\frac{1}{2}$ gr) daily for 7 to 10 days

b Em tine Hydrochloride Injection U S P B P 65 mg (1 gr) daily subcut f r 6 days will control acute ymp toms and eradi ates inf ction in 15 per cent of cases Em tine has been r placed by less toxi and equally ef fective agents s ch as chloroquine (s e bove)

c Ca ba son U S P B P 0 25 Gm ($3\frac{3}{4}$ gr) t i d orally f 7 to 10 days o Bismuth Glycolylarsanilate N N R (Milibi ®) 0 5 Gm ($7\frac{1}{2}$ gr) t i d for 7 days

d Iodochlorohydro yquinoline N F (Vioform®) 0 25 Gm ($3\frac{3}{4}$ g) t i d rally for 14 day

Erythromyci 15 mg per Kg body weight daily for 10 to 14 days This a tibi tic is effective fo th treatm nt of ute moebi is

f Fumagillin 0 5 to 1 mg per Kg body weight daily for 10 to 14 days Employed f drug refra tive cases of hroni amoebia i

2 Evaluation of therapy Fol wing ompletion of th rapy wait on w k and xamine stools on thre successive days

a If still positive epe t above our of t tm t and re xamin s for first our

b If n gative give n f rth r tre tm t R xamine tools t 4 w k i tervals until a tot l of 12 specim ns have be n found to be n gative

3 To ic re ction of the ti am bic drugs

a Em tine hydrochlo d Contrai dicated in r ,o e rditai dise se N us vomiti g m e lar weak urtia myoc rd ti and prostrat on may oc u Special ob rvation and preca tion include th f llowing
(1) Bed rest without lavatory pri il ges
(2) Blood p s ure determination b i d
(3) Pulse det rmination q i d
(4) Daily xamination of pati nt
(5) E g before and aft r ourse of therapy
(6) Withdraw drug in the event of to icity

b A i -containi g compounds (Ca barsone Milibis®) Contraindicated in hepatic dise se Naus vomiting iarr ea hea nd & w ti may occur Daily inspection f toxi ymptom i nec ssary Stop drug val of to ty tion

Iodine-con ai ing compounds Iodochlorohydroxyquino line (Viof rm®) C ntrai dic ted in renal dise se Cast ur inal upset and diarrhe and or Daily inspe tion for t y effects (uncommon) i nec ssa y Stop drug in event of r action and w f f w days w k the are done

C Hepati Am bia is
1 Measures for hepatitis
a *Chloroquine Diphosphate N N R* (*Aralen®*) is the drug of choice in hepatic amebiasis since it has proved to be effective in emetine resistant cases and is much less toxic Like emetine this drug has rather feeble intestinal effects it is therefore necessary to follow the course of chloroquine with Vioform® carbarsone or one of the antibiotics notably erythromycin or fumagillin (see above)
Dosage Chloroq ine diphosphate 0 5 Gm (7½ gr) (or 0 3 Gm of the base) b i d for 2 days followed by 0 5 Gm (7½ gr) daily for 12 to 19 days
or b Emetine hydrochloride injection 60 mg (1 gr) subcut daily for 9 days if chloroquine is not available or fails to provide a desirable therapeutic effect
c Hepatic function tests may determine degree of liver involvement
d Erythromycin and fumagillin now under trial may prove to be equally effecti e against both hepatic and intestinal amebiasis
e General supportive measures should be instituted as for infectious hepatitis (see p 279) A 2 week rest period may be followed by a repeat course of treatment After the patient has convalesced from his hepatic disease further anti amebic drug therapy might be considered in an effort to eradicate the intestinal infection
2 Measures for liver abscess
a Treat as for hepatitis (see above) If patient responds to chloroquine or emetine treatment follow up with other amebacides for a period of 2 weeks (see p 480) A repeat course alternating these drugs may be necessary after a rest period of one week
b Small abscess If patient responds to hepatitis treatment use combined and then alternating courses of chloroquine or emetine and other drug therapy (see above)
c Large abscess If patient does not show definite response to emetine or chloroquine treatment
(1) Continue treatment and carefully attempt to localize abscess site by physical and x ray findings Aspirate under aseptic conditions (preferably operating room) and repeat aspiration if necessary Avoid open drainage unless abscess is secondarily infected
(2) Continue drug therapy (see above) until evidence of both hepatic and intestinal disease is eradicated
d *Secondarily infected abscess*
(1) If aspirated material reveals pus and organisms (by smear and culture) it may be necessary to establish open drainage (by extra serous approaches)
(2) Chemotherapeutic agents should be employed in these cases (see pp 496 514)
(3) Complete course of anti amebic therapy as for *hepatitis or liver abscess* if indicated (see above)
3 Observe for toxic reactions (see p 481)

D Amebi sis of Oth r Organs Specific therapy as for acute or chronic amebic dysentery

E Asymptomatic Amebiasis (Carrier St te)
1 F ll co r e Some linicians f l that amebiasis always has ayst mic as well a local effects they th refore recommend a full cou se of therapy a for acute or chronic dyse tery (se p 480)
2 Simple oral ambulatory treatment is consid red satisf tory by other clinicians
a Carbarsone 0 25 Gm ($3^{3}/_{4}$ gr) t i d orally for 7 days
b Vioform® 0 25 Gm ($3^{3}/_{4}$ gr) t i d orally for 14 days
c Follow up stool examinations should be performed as for active am bic inf ction (s e p 481)

F F llow-up P tients should be f llow d by clini al and labo a tory xaminations on at least one occ sion each month for 3 to 6 months following th rapy Examination should include sig moidos opy and study of fr sh stools on 3 succ ssi days (pref rably at l ast 1 following saline catharsis) Repeat ex aminations should be perform d within a year If necessary Need for hemotherapy mu t be based upon actual demonstra tion of am bas rather than mere presenc of ymptoms (e g chronic diarrhea) Con ider the poss bility of compl. ations of the di i e se ondary inf tion irritation of bow l from chemotherapy psychic trauma etc when pe sistent symptom are not substantiated by laboratory findings A oid overtreat me t with emetine or other drugs

GIARDIASIS (code No 604 155)

Giardiasis i manife ted by recurre t episod s of diarrhea consisting of wat ry e mi solid o bulky and oft n foul smelling stools A mild c tarrhal hole ystitis m y occur The specifi diagnosis is made by demonstration of Giardia lamblia (inte tinalis) in the stools

Treatment

A Quina rin Hydrochl ride U S P Mepacrin l ydrochl ride B P (Atab ine®) 0 1 Gm ($1^{1}/_{2}$ gr) t i d fo 5 days
B Repeat stool examination aft r one week to d t rmine effica y of treatment Repeat tre tment if nec ssary

DISEASES DUE TO METAZOA

TRICHINOSIS (code No 255)

Tri hinosi i ca sed by the i gestion of raw or imp operly cooked infect d pork It n also be traced to other ind tdua who have consumed the same i f ted food The inc bation period is from 2 days t 4 we ks

A A [illegible] M y be very mild or may be f tal The gastroin e nal symptoms occur earl and are fo wed af r f w days by sys mi and other involvem nt
1 Gastroi te tinal symptoms N sea vomiti g cramps diarrhea Catu as consti pa ion

2 Constitutional symptoms Fever chilliness weakness
3 Skin Rash periorbital and dependent edema splinter hemorrhages
4 Muscles Pain and tenderness in muscles
5 C N S May show any central or peripheral neurological involvement headache prominent
6 Eosinophilia
7 Trichinella skin test Delayed reaction (noted only after 12 to 24 hours) Occurs early in the disease (3rd to 7th day)

B Chronic Manifestations
1 Vague symptoms Weakness and other symptoms referable to multiple organ systems
2 *Eosinophilia* Often marked
3 Trichinella skin test Immediate reaction (noted after 5 minutes) occurs late in the disease (from 17th day on)
4 Muscle biopsy may demonstrate organisms

Treatment.

A Supportive and Symptomatic Severe acute cases require hospitalization and excellent nursing care
B No effective specific therapeutic agent is available
C Corticotropin (ACTH) and cortisone or hydrocortisone provide effective relief for the acute symptoms of trichinosis A reduction of the eosinophil count disappearance of fever and splinter hemorrhages if present and a general improvement in the clinical state of the patient are guides which should be employed to determine the efficacy of treatment
1 Acute stage Treat with relatively large doses of either drug for first 24 to 48 hours (see p 423)
2 Subacute stage Therapy may have to be continued for several days or weeks to prevent recurrence of symptoms The dosage is reduced keeping symptoms under control (see p 423)

ASCARIASIS OR ROUNDWORM DISEASE (code No 650 241)

Infection with Ascaris lumbricoides may cause no symptoms or only ill-defined gastrointestinal and nervous symptoms Occasionally generalized urticarial reaction may develop rarely ascaris pneumonia may result The specific diagnosis is made by finding the worm s eggs or adult worms in stools or vomitus or by observation of the adult worm passing from nose or mouth

Treatment.

A Hexylresorcinol U S P (drug of choice for adults)
1 Initial purgation Give 30 Gm (1 oz) magnesium s lfate in water or 240 cc (8 oz) of solution of magnesium citrate the night before drug therapy
2 A light meal is given the preceding evening and then no further food until at least 5 hours after taking the hexylresorcinol
3 Alcohol is contraindicated before and during treatment
4 Hexylresorcinol 5 hard gelatin capsules 0 2 Gm (3 gr)

(crystoids) (total 1 0 Gm 15 gr) are given in the morning on an empty stomach These are to be swallowed whole not chewed Doses for children Under 5 ye rs of age 0 4 Gm (6 gr) 5 to 8 ye rs 0 6 Gm (9 gr) 8 to 12 years 0 8 Gm (12 gr)

5 Purgation Two hours later give 30 Gm (1 oz) magnesium sulfate in wat r to remove the worms from the bowel R pe t 2 hours later if nec ssary for purgation
6 Stool examination should be made one we k later on 3 su cessive days to d termine efficacy of treatment
7 Treatment may be repeated in 3 days if n ce sary

B Di thylc rbamazine (H traza ®) Method of choice for the treat ment of s aria i in children Give 12 mg pe Kg body weight once a day for 4 days Pre treatm nt f sting and pre o post treatment purgation are not necessary

C Oil of Chenopodi m d T tra hl roethyl n May be used if hexylr orcinol i itself ti e or not vailable Caution. T trachloroethylene stimulat s activity of as ari and may res lt in bowel obstruction A preliminary cou se of hexylre sorcinol is advised before using the combined m thod
1 Follow proced re of tre tment as m ntioned above for hexylreso cinol
2 Oil of chenopodium 0 3 cc ($4^{1/2}$m) apsul and t tra chloroethyle e three 1 0 cc (15m) soluble gelatin apsules (total dose 3 0 c 45m) are given together and followed by purgation s me tioned above

ANCYLOSTOMIASIS OR HOOKWORM DISEASE
(code No 650-243)

Most commonly c d by N cato am ricanus (new world) or Ancylostoma duodenale the dis ase oc urs wh n a suffi ient num ber of the worms are pres t in the intestine It is manif sted by f tigue weakness dyspnea palpitation anorexia perverted appetit weight loss and a mild microcyti anemia 'Ground itch' an erythematou or mac .opapular or vesicular pruritic dermatitis may develop at the site of penetration of the skin by the larvae The spe ific diagnosis is made by findi g the charact ristic eggs in the stool

Rece t work indic t s that symptoms are most oft n due to a coexisting def i ncy disease Correction of the ma nutrition by adequate d tary m ns and of the anemia by the addition of iron ppears to alle iat or remove the manifestations in the absence of specific treatment for the hookworm infection

Treatment.

A General Tre tment Estimation of the need for treatment should be ba ed upon quantitative counts of the eggs in the stools There is no indication for treating light infections par ticularly afte completion of previous therapy It is oft im possible t completely eradicate the infection
1 Correct malnutrition Provide an adequate protein diet with suppl mentary iron medication (see p 319).
2 Rel out pos ibility of coincidental ascariasis a If

3 Gentian Violet U S P Crystal Violet B P (4 hour enteric coated tablets) 1 mg per lb body weight divided into 3 daily doses a c Administer daily for 6 days follow with a rest period of 6 days and then administer again for another 6 days

TAPEWORM INFECTIONS (code No 604 261) (Pork Beef Fish Dwarf or more rarely Dog or Rat Tapeworms)

Diagnosis

A History of consumption of raw or incompletely cooked pork beef fresh water fish or other contaminated food

B *Acute Phase (usually after a long incubation period of 3 to 4 months)* Diarrhea fever leukocytosis and eosinophilia

C Chroni Phas , Vague gastrointestinal and C N S symptoms mild to severe anemia and presence of gravid proglottids in feces or on underclothing

D Specific Diagnosis

Species and Source	Best Demonstrated By
Taenia saginata (beef) Taenia solium (pork) Dipylidium caninum (dog)	Gravid proglottids in feces (occasionally by eggs in feces)
Diphyllobothrium latum (fish) Hymenolepis nana (dwarf) Hymenolepis diminuta (rat)	Eggs in feces

Treatm nt,

A Specific Measures

1 Quinacrine Hydrochloride U S P Mepacrine Hydro chloride B P (Atabrine®)

a *On day preceding treatment patient eats* a light low residue lunch and supper

b Sodium sulfate or magnesium sulfate 15 to 30 Gm (1/2 1 oz) cathartic the night before treatment

c On morning of treatment omit breakfast *Give pheno* barbital 30 to 90 mg (1/2 to 1 1/2 gr) depending upon the weight and age of the patient One hour later administer two 0 1 Gm (1 1/2 gr) tablets of quinacrine hydrochloride every 5 min tes with a glass of water containing 1/2 tea spoon of sodi m bicarbonate until 8 tablets have been given

d Sodium sulfate or magnesium sulfate 15 to 30 Gm (1/2 1 oz) in water is given two hours following th rapy to rid the intestine of the parasite No food should be per mitted until the bowels move copiously

e The patient should have his evacuations in a basin of warm water to facilitate procurement and identification of the head and proglottids Toilet paper should be dis posed of separately Examine all stools passed during the next 24 hours in order to recover the worm head for proof of complete eradication

f Repeat course of treatment after 7 days if necessary

2 Hexylresorcinol U S P
   a 1 0 Gm (15 gr) dissol d in 20 cc water introd ced into the d od num by a tube Follow in two hours with sodium sulf te o magnesium sulf t p ge Examin stools for head of worm
   b Crystoids anthelmintic as administ red in ascariasis (s p 484) is the drug of choi e f the treatment of Hymenol pis nana (dwarf tapeworm) infections
3 Aspidium Oleore i U S P Extract of Male F rn B P
   a Contraindi tions Severe cardiac hepatic or renal dis se con tipation acute or chronic gastroenteritis febril stat s p gnancy and inf ncy
   b Semi starvation fat free diet for 24 to 48 hou s prior t drug therapy Lunch nd s ppe should be omitted on th day bef re treatme t Alcohol is contraindicated
   c Magne i m sulf te or sodium sulfat 15 to 30 Gm (½ 1 o) in wat is gi en at 6·00 p m th night before and again in the morni g before administ ring the drug
   d ℞ A pidi m ol oresin 5 0 gr lxxv
      A a ia 6 6 gr c
      Distilled water q s d 60 0 ℥ii
   Give half this solution at about 7 00 a m orally o by duod nal tube nd an hou later give the remaining half
   e M gne ium sul t or sodium sulfate 15 to 30 Gm (½ 1 oz) in wat r is give again 2 to 3 hou s aft r the cond dose of a pidium in order to rid the int stine of the parasite as w ll as the drug Give a soapsuds enema 2 ho rs after the ond c thartic N food should be permitted until the bowels mov copiously
   f R pe t os e of treatm t in not l than 7 days if nec s ary

SYSTEMIC MYCOSES

My oti infections are ed by vari ty of fungi and have a wide ge graphi di tribution Although their incid nce i rather low i rtai part of the world som of them occu quit commonly C occidioidomycosi is the San Joaquin Val y of C l f rni Thei l ni al m nif ations a e c dingly va iabl with som resemblanc to the granulomatou dise se

COCCIDIOIDOMYCOSIS (code No. 012 213)
(Pulmonary code No 360 213)

Coc id, idomycosis or Vall y Fever is an infection du to Coc id, ide imm is whi h is found in the Southwe t Uni ed Sta M xi o nd Ce tral and South Americ with poradic ca in Italy nd Hawaii

Di gnos
A i w y Form I olves the bronchi and lungs and may mani f i t ss ed i h t r ough rythema nodosum and pos ive with Tes.on X y of the lungs during the p imary d sease

shows patchy soft infiltration as this clears residual nodular shadows may persist Thin walled cavities with little surrounding infiltration may develop and remain for months The sedimentation rate is elevated organisms may be found in the sputum by culture and the skin test may be positive after 10 to 14 days Complement fixation and precipitin tests are helpful in establishing a diagnosis and may aid in determining the progress of infection

B <u>Chronic or Granulomatous Form</u> 0 2 per cent of all primary cases progress to the granulomatous stage involving the lungs chest wall or other structures In the granulomatous stage the finding of the organisms in infected tissue or in the discharge from the lesions makes the diagnosis Prognosis in this form is poor

<u>Treatment.</u>

No specific therapy is known for either form of the disease

A <u>Prim ry Form</u> Bed rest and symptomatic care until process has subsided

B <u>Chronic Form</u> Treatment entirely symptomatic Potassium iodide is of no value and may even be dangerous

ACTINOMYCOSIS (Regional code No 0 202)
NOCARDIOSIS (Pulmonary code No 360 201)

Actinomycosis is world wide in distribution and is caused by an anaerobic actinomycete Actinomyces bovis Nocardiosis is caused by a variety of aerobic types belonging to the genus Nocardia (e g *N asteroides N mad rae*)

<u>Diagnosis</u>

A <u>Actinomycosis</u> The principal lesions are multiple abscesses sinuses and fistulous tracts which discharge a sanguino purulent material containing sulfur granules Any region of the body may be infected but th head and neck are most frequently involved in which case very little systemic reaction occurs The abdominal viscera may be involved by way of the intestinal tract or the lungs ple ra and chest by way of the respiratory tract In the latter two forms there may be symptoms referable to the system affected accompanied by chills and fever The finding of the typical sulfur granule in the lesion is diagnostic

B <u>Nocardia infections</u> may resemble classical actinomycosis with the production of chara teristic granules or produce a pseudotuberculous involvement of the lungs and pleura with extension at times to brain and meninges Various species of Nocardia cause infections of the subcutaneous tissues with bone involvement (mycetoma)

<u>Treatment.</u>

A <u>Actinomycosi</u> The t eatment of actinomycosis must frequently be continued for weeks or months

1 Penicillin is the drug of choic An initial dose of 120 000 units should be followed by 80 000 units every 4 hours The

use of much higher dos s is recommend d by some clini ians daily intram s ular inje tions of 600 000 units fo rvico fa ial act nomycosis a d one to two million units per day fo the pulmonary nd bdominal types

2. Sulf dia ine The concomitant us of sulf diazine has been found beneficial in certain instanc s

3. Potassi m iodide With ome patients the bove combined medication should be s ppl m m d by iodide therapy but ext me ca tion m st be used in sensitive pati nts Give sat rat d solution of Potassium Iodid U S 1 3 d ops t i d Increasing ch dose by *one drop* t i d until re a tions occ o a total of 20 drops t i d is reached Thi may be furthe increas d and as much as 100 drop t i d may be u ed if the pati t n tolerat this dos ge If e actions occ stop drug and begin gain at a lower dosage In s n iti e pati nts it may be necessary to start with 1 or 2 d ops daily nd gradually in re se dos

B. Noc dioal Treat as fo actinomy osis The dis ase pro ducing aerobi Noc rdia are mo sus eptible t the sulfonamides than is A bovis Treat with s lfadi zine alone or combine with s lf merazin M intain blood lev l of 10 t 20 mg per 100 c until inf tion is cont oll d Patie t should be main tai ed on sulfonamid th rapy 3 to 4 months f llowing appa nt re

BLASTOMYCOSIS

(Generalized code No 012 200) (Of Skin code No 110 217)

N th Am ri n blastomycosis chiefly n t d in N rth Carolina Illinois d M i sippi i due to Bla tomyc dermatitidis The Sou h Am i n va iety is due to B brasilien i nd i found main ly in Brazil

Di gnosi

The North American va iety p oduces gran lomatous l e ating on of the kin and tuberculosi lik l ions of the lungs and at tim of oth el act res The c aneous f rm usually is without s st mi symptom but the pulmona y fo m usuall has symptom not unl k tho of pulmona y tuberc losis

The South Ame i an vari ty invo ves the mucos m mbranes of the mou h the skin the lymphatic tis u and the viscera

Th diagnosis of (ther vari t depends pon mic oscopic re og ni ion of the charact i tic ye t like fungus in tiss s or exudat followed by isola ion of the o ganism i culture

Treat m

A. Potas i m io d the apy should be give s f tinomycosis (ee bove) Befor adminis ration of t drug the pati t shou d be t sted f sensitivity to the fung and to i s d g If these actions are not observed syre d ug of the infect ou prox ha may be At the beginn g of the treatm t an y small amount of pot ium iodide should be used F rther more to prevent d semination of the inf t on desensitization or increas dosage with fun omyce va cine may be ne s ry

B Stilbamidine has proved to be quite effective in the treatment of cutaneous and systemic blastomycosis Dose is 10 to 200 mg daily not exceeding 2 to 3 mg /Kg daily It is given slowly I V in 5% glucose in water or in saline A course of 30 days may be required This drug has to be employed with caution since it is toxic and frequently produces a neuropathy espe cially of the fifth nerve A related drug 2 hydroxystilbamidine has been used successfully on patients infected with B derma titidis It fortunately does not produce peripheral neuropathy
C X ray therapy may be used as an adjunct in the cutaneous cases The systemic forms are rather resistant to treatment and progress in spite of therapy

HISTOPLASMOSIS (code No 010 218)

Histoplasmosis is caused by Histoplasma capsulatum a small yeast like organism in tissue and a mold like fungus in culture It has a world wide distribution It primarily involves the reticulo endothelial system causing enlargement of the liver spleen and lymph nodes and systemic manifestations of fever anemia and leukopenia However other systems may be involved Patients from endemic areas often have pulmonary calcifications negative tuberculin tests and positive histoplasma skin tests

Treatment.
None known

MONILIASIS
(Pulmonary code No 360 209)
(Thrush of Mouth code No 610 209)

Moniliasis is an infection caused by Candida albicans which usually affects the mucous membranes of the mouth and vagina and the skin and nails It may rarely involve the lungs and meninges The diagnosis of the pulmonary form may be difficult cough and scanty sputum are most common findings x ray appearance is similar to that of tuberculosis but tubercle bacilli cannot be demon strated in the sputum One must demonstrate the constant presence of Candida albicans before the diagnosis can be entertained How ever the organism may occur as a normal habitant of the throat so great care must be taken in making the diagnosis of pulmonary moniliasis

Treatment.
A Oral Inf ction Alkaline mouth washes Topical application of gentian viol t dil ted 1 10 000 in 10 per cent alcohol for 4 to 5 days
B Vaginal Inf ction Alkaline douches douches of potassium permanganate 1 1500 or gentian violet 1 10 000 propionate vaginal j lly
C C t neous Infe tions Soak involved parts twice daily in 1 2000 potassium permanganate for 30 minutes Follow with 1 per cent gentian violet paint in 15 per cent alcohol

CRYPTOCOCCOSIS OR TORULOSIS

(Of Skin code No 110 21x) (Meningitis code No 910 21x)

Cryptococcosis involv s chi fly the skin and central nervous system but may invade other structures It is world wide in dis tribution and is ca sed by Cryptococcus neoformans (Torula histo lyti a) The cutaneous l sions are pustules granulomatous ul ers or nodules Meningeal invol ement is the usual central n rvous sy t m lesion The dis ase is usually mistaken for tuberculous meningitis if the o ganisms are not found

Tr atment,
None other than symptomati

IMMUNIZATION SCHEDULES

Biologicals for immunization p rposes are gradually being modified and conce trated Th schedules below do not apply to all pr parations *follow the manufacturer s instructions which accompany the preparation*

Childre ,

1 During first year
   a Uncombined method Pertus i vaccine (20 billion organ isms per cc) subcut injections of 1 cc 2 cc and 2 cc at one month intervals beginning at 2 to 3 months of age Diphtheria tetanus toxoid (alum or al minum hy droxide) s bcut inje tions of 0 5 1 0 and then 1 0 cc t one month int rvals beginning at 6 months of age and mallpox vaccination t 6 months to 1 year of ag Repe t if a tak does not occur
   or b Combined method Diph heria pertussis tetanus (com bin d) subc t injections of 0 5 1 0 and then 1 0 cc at one month intervals tarting at 2 to 6 months of age and mallpox vac ination as with uncombined method
3 At two years Schi k t st and booster dose of diphtheria pertussis tetanus mixture 1 0 cc by subc t injection
2 At s hool age Repeat proced re as for two years and do va cination (repeat if a take does not occur)

Ad l

Adults traveling to foreign countri s shou d obtain a list of required immunizations when applying for pa sports Thos living in endemic area should maintain their immunization

1 Smallpox vac ination Repeat every 5 years or on expos re
2 Typhoid (or typhoid paratyphoid) vaccine (1 billion o ganisms per c) 0 5 1 0 and then 1 0 cc by subc t injection t weekly int rvals Repe t seri every 3 years
3 Yellow fev vaccine (Africa South Ame i a) 0 5 cc subcut
4 Typhus vaccine (Co type) (E rope A Africa A stralia South Ameri a and Mexi) 1 0 cc subc t repeat d 7 to 10 days lat r for total of 2 doses Repeat 1 0 cc every 4 to 6 months
5 Cholera vaccine (Asia Near East East Indi s) 0 5 and then 1 0 cc every 4 to 6 months

6. Plague vaccine (2 billion organisms per cc) (Egypt Asia East Indies) 0 5 and 1 0 cc subcut at interval of 7 to 10 days
7. Tetanus toxoid 1 0 cc subcut repeated at 30 and 60 days for total of 3 doses *Booster injection of 1 0 cc 1 year* later and on injury
8. Diphtheria immunization in adults who are Schick positi e is frequently followed by severe local and general reactions A Maloney test (0 1 cc of 1 20 dilution of fluid toxoid) should be applied intradermally If negative 0 5 1 0 and then 1 0 cc subcut may be given at monthly intervals If positive inject intradermally 0 1 cc of 1 10 dilution of toxoid at 3 to 4 week intervals for 3 doses

SENSITIVITY TESTS AND DESENSITIZATION

Sensitivity Tests

Before injecting antitoxin or similar other material derived from animal sources always perform the following two tests for sensitivity

A. Intradermal Test. Inject 0 1 cc of a 1 10 dilution of the antitoxin intradermally into the skin of the flexor surface of the forearm A positive test is manifested within 30 minutes by the occurrence of a large wheal and surrounding areola
B. Conjunctival T st Instill 1 drop of a 1 10 dilution of the antitoxin into the conjunctival sac of *one eye* as a test dose and 1 drop of physiological saline in the other eye as a control A positive test is indicated by conjunctival injection itching and edema occurring within 30 minutes

Interpretation of S nsitivity Tests

A. *Neg tive T sts If* both tests are negative no desensitization is necessary and a full dose of the antitoxin may be given
B. Positive Test. If one or both of the tests are positive desensitization is necessary Proceed as below

Desensitization

A. I r cautionary Measures
   1. Antihistam nic drug should be administered before beginning desensitization in order to lessen any reaction that might occur (see p 66)
   2. Fpinephrine U S P Adrenaline B P 0 5 to 1 0 cc *(8 15m) of a 1 1000 solution must be ready in a syringe* for immediate administration
B. Desensitization Method The following plan may be used in desensitization Give doses I M at 30 minute intervals and observe closely for reactions

1st dose	0 1 cc	(1 10 dilution)
2nd dose	0 2 cc	(1 10 dilutio 1)
3rd dose	0 5 cc	(1 10 dil tion)
4th dose	0 1 cc	(undiluted)
5th dose	0 2 cc	(undiluted)
6th dose	0 5 cc	(undiluted)
7th dose	1 0 cc	(undiluted)

8th and subsequent doses 1 0 cc (undiluted) every 30 minutes until the total amount of antitoxin is given

Tre tm nt of R a tions

A If mild reaction occu s drop back *to the* next low r dose and continue with the d sen litization *If severe re* ction occu s administ r ep nephrine as mention d below and di ontinue the antitoxin *unless this* tre tm nt is u gently need d Should de nsitization be *imperativ* ontin e slowly *using* mo e gradual increas of th antit xin

B *If* manifestations of a severe reaction *appear* give *0* 5 to 1 0 cc (8 15m) of epineph ine s bcut at once The *symptoms* include urti aria a gion uroti ed ma *dyspnea coughing* choking or shock Maintain close observation of the patient and repeat epinephrine as necessary

Chapter 19

CHEMOTHERAPEUTIC AGENTS

The sulfonamide drugs and the antibiotics penicillin strepto mycin chlortetracycline (Aureomycin®) chloramphenicol (Chloro mycetin®) oxytetracycline (Terramycin®) tetracycline bacitracin polymyxin neomycin and erythromycin are powerful agents af fecting a wide variety of pathogens Each however has a definite and limited *antimicrobial spectrum and beneficial effects can be* obtained only in infections due to those organisms included in the spectrum *Etiological diagnosis in infections is of para mount importance*

Indiscriminate use of antibacterial agents is wasteful may lead to a false sense of security by doing something and may cause serious toxic effects The sulfonamide drugs in particular are potentially dangerous agents and should be reserved for certain specific functions

Certain chemotherapeutic agents e g penicillin and strepto mycin may exert synergistic activity in infections notably those due to Streptococcus fecalis On the other hand it has been shown in the laboratory that penicillin is antagonized by chloramphenicol chlortetracycline and oxytetracycline when the infecting organism is penicillin sensitive The clinical importance of this antagonism is not known At any rate the use of two or more antibiotics in combination is probably best avoided except under careful labora tory control

Indications for Use of Chemotherapeutic Agents

1. Against an infe tion due to a proved pathogen known to be susceptible to the proposed drug (e g subacute bacterial endocarditis due to Streptococcus viridans which is suscep tible to penicillin)
2. Against an infection wherein a susceptible etiological agent may be reasonably assumed from the clinical picture to be present (e g lobar pneumonia due to a Pneumococcus)
3. As an attempted lifesaving measure against infections of *obscure etiology This category should be sharply* limited
4. As prophylaxis against potential invaders (e g during and following tooth extraction in patients with valvular heart disease to prevent subacute bacterial endocarditis)

SULFONAMIDE DRUGS

The sulfonamide drugs are substituted derivatives of sulfanilamide. Newer derivatives have wider antibacterial spectra and more desirable pharmacological properties than the older sulfonamides. Since the activity of any sulfonamide compound may be predicted on the basis of certain physicochemical principles, it is evident that maximal antibacterial effectiveness has been approximated by sulfadiazine, sulfamerazine, sulfamethazine, and sulfisoxazole (Gantrisin®), and the use of older sulfonamides is rarely if ever warranted.

Indications and Antibacterial Spectrum (See table on p. 514.)

The sulfonamide drugs have a wide but still limited range of activity against pathogenic agents. At the present time the sulfonamides are the therapeutic agents of choice only in meningococcal infections (*Neisseria meningitidis*).

A. Except for the infection mentioned above, the sulfonamides should be used as alternate or additional agents to one of the antibiotics against infections of known susceptibility.

B. Promin®, Promizole®, and Diasone® are members of the sulfonamide group which show promise within a limited area, are usually used in addition to other agents against the following pathogens:
   1. *Mycobacterium tuberculosis*
   2. *Mycobacterium leprae*

Absorption

The sulfonamides are poorly absorbed from the stomach but are readily absorbed from the small and large intestines. Peak blood concentrations are reached in from 2 (sulfanilamide) to 6 hours (sulfamerazine) following a single oral dose. The sodium salts are rapidly absorbed from intramuscular or subcutaneous sites.

Distribution

A. **Distribution Through Body and into Body Fluids.** The sulfonamides are rapidly distributed throughout the body and readily find their way into exudates, transudates, saliva, bile, gastric and intestinal secretions, pancreatic juice, milk, cervical and prostatic secretions, amniotic fluid, and fetal blood. Sulfadiazine and sulfamerazine enter the cerebrospinal fluid and attain approximately one half the plasma concentration.

B. **Binding of Plasma Proteins and Liver Action on Sulfonamides.** Approximately one half of the sulfonamide in the blood is bound to plasma protein and is inactive. About 10 to 20 per cent is acetylated by the liver and also is therapeutically inactive.

Excretion

A. **Mechanism of Renal Excretion.** The sulfonamides are almost entirely excreted by the kidney, the rate of excretion depending on the rate of urine flow rather than the plasma level. Tubular resorption of 10 to 80 per cent occurs. Impaired renal function may result in dangerously high blood concentrations and may be anticipated by means of the phenolsulfonphthalein

(P S P) test Sulfanilamide is excreted most rapidly and sulfamerazine most slowly necessitating less frequent admin istration

B Solubility Factors in Excretion The sulfonamides and their acetyl derivatives are more soluble in alkaline than in acid urine hence alkalinization together with increasing urine out put prevents precipitation of the drugs in the urinary tract Since each sulfonamide is soluble in the urine independently of the presence of any other the simultaneous administration of fractional doses of two or more sulfonamides further lessens the likelihood of precipitation while still permitting an effective blood level of combined sulfonamides Sulfisoxazole (Gantrisin®) is highly soluble in the urine

Mode of Action.

A Bacteriostatic Activity (Not Bactericidal) The sulfonamides are bacteriostatic and depend on body defense mechanisms for final destruction of the pathogenic agents

B Bacteriostasis Occurs by Interfere ce with Growth and Division. The sulfonamides act against bacteria by reason of their structural similarity to para aminobenzoic acid (PABA) which is an essential substrate for certain necessary e zyme activities of bacteria The sulfonamide molecule when in ex cess of para aminobenzoic acid is substituted for the natural *substrate of the enzyme system and thus renders the organism* incapable of growth and multiplication

C Natural and Acquired Resistan e to S lfon mid s Bacteria may be naturally resistant to the action of sulfonamides by reason of being able to synthesize para aminobenzoic acid (PABA) or may acquire resistance wh n allowed to exist in a low concentration of sulfonamide In this instance only individual organisms best able to synthesize PABA survive and multiply

D Ne tralizing Effect of Para aminoben oic Acid (PABA) in Sulfonamide Therapy PABA is a fract on of vitamen B complex and will compete with the sulfonamides in the enzyme activity of the bacteria and so interfere with the antibacterial effects of the sulfonamides Large amounts of crude B complex or liver extract should not be given to patients under sulfonamide therapy Procaine and certain other local anesthetics are esters of PABA and may exert local anti sulfonamide activity PABA should be included in cult re media used to isolate organisms from patients receiving sulfonamides so that the drug present in the body fluid which is cultured may not alter the true bacteriological picture Exudates and other substances which promote bacterial growth inhibit sulfonamide activity

Blood Levels.

Under most circumstances effective blood levels will be at tained by following standard dosage recommendations Insufficient blood levels may be followed by development of sulfonamide resist ance by the infecting organism Since urine concentrations are 10 to 20 times that of the blood the dosage in urinary tract infections unaccompanied by marked tissue invasion or bacteremia may be

A Blood Levels of Sulfonamide Should Be Determined Under the Following Circumstances

1. Repeated parenteral administration
2. Lack of expected therapeutic effect
3. Unusually high d ses
4. If renal insufficiency is s spect d o known

B. Optimal Levels (Blood)

Sulf dia o	8 15 mg %		
Sulfam razin	8 15 mg %	Sulfanilamide	5 15 mg %
Sulf thiazole	3 7 mg %	Sulf pyridine	3 10 mg %

Dos ge a d M thods of Admi i tration

A. Oral

1. Adults
   a. Most infections
      (1) Initial dose 2 to 4 Gm (30 60 g) of one of th s lf namides or of a mixture of s lfonamides
      (2) Maintena c dose
      ( ) 0 5 Gm (7½ g) ea h of s lfadi z merazine ev y 6 hours (prefe red method) nd lf
      or (b) 1 0 Gm (15 g) of sulfisoxa ol (Gan i ®) every 6 hours
      or (c) 0 33 Gm (5 gr) each of sulfam razine s lf dia zin and s lfathiazole every 4 to 6 hou
      or (d) 1 Gm (15 g) of sulf nilamid lf thi zole ev ry 4 hours lf py id ne
      or (e) 1 Gm (15 gr) of sulf dia in e ry 4 t 6 hou
      or (f) 1 Gm (15 gr) of s lfam razine ry 6 to 8 hou
   b. Urinary tract infections 0 5 to 1 0 Gm (7½ 15 g) f one of the sulfonamides o of a mi t re of lfonamid every 4 to 8 hours
   c. Prophylaxis of streptococ al inf tions 0 5 Gm (7½ g) of one of th s lfonamide or of a mi t re of lfona mides (s) daily
   d. Int stinal infection Initial dose of 0 05 Gm (¾ gr) /lb body wt (0 11 Gm /Kg) of s l gua id ne o Sulf s din ® and follow d by 025 Gm (⅜ g) lb body wt (0 055 Gm /Kg) e ry 4 hou
   e. Leprosy and tuber losi (ral nd I V)
      (1) Promin® 4 c (1 d) d ily I V f 3 w k the rest one week and repe our s frequent needed
      or (2) Promizole® 1 to 6 Cm (15 90 g) da ly by mou h divid d dos
2. Children
   a. Most infe tions
      (1) Initial dose 0 02 Cm (⅓ g) b body wt (0 045 Gm /Kg) of one of t e u on m des or of mi t e of sulfonamides
      (2) Maint nance dose
      ( ) 0 005 Gm (1 2 gr) /lb bo y wt (0 01 Gm Kg) ea h of s "a ine nd e me ine ry 6 hours (pref rred m tho)
      or (b) 0 01 Cm (⅛ gr) b bod wt (0 02 Gm Kg) of s f sox ole (Ga i ®) e y 4 to 6
      or ( ) 0 0033 Gm (1 3 gr) lb body wt (0 007 Kg) ea h of s l r ine z i ne mera ine e ry 4 hou

or (d) 0 01 Gm (1/6 gr) /lb body wt (0 02 Gm /Kg) *sulfanilamide sulfapyridine or sulfathiazole every 4 hours*

or (e) 0 01 Gm (1/6 gr) /lb body wt (0 02 Gm /Kg) *of sulfadiazine every 4 to 8 hours*

or (f) 0 01 Gm (1/6 gr) /lb body wt (0 02 Gm /Kg) *of sulfamerazine every 6 to 8 hours*

b *Urinary tract infections* 0 005 to 0 01 Gm (1/12 1/6 gr) /lb body wt (0 01 0 02 Gm /Kg) of any of the sulfonamides or of a mixture of sulfonamides every 4 to 8 hours

c *Prophylaxis of streptococcal infections* 0 005 Gm (1/12 gr) /lb body wt (0 01 Gm /Kg) of any of the sulfonamides or of a mixture of sulfonamides twice daily

d *Intestinal infections* Initial dose of 0 05 Gm (3/4 gr) /lb body wt (0 11 Gm /Kg) of sulfaguanidine or Sulfasuxidine® followed by 025 Gm (3/8 gr) /lb body wt (0 055 Gm /Kg) every 4 hours

e Leprosy and tuberculosis (oral and I V doses)
(1) *Promin®* 0 5 3 0 cc (8 min 3/4 dr) daily I V for *3 weeks then rest one week and repeat course as* frequently as needed
or (2) *Promizole®* 0 25 1 0 Gm (3 3/4 15 gr) every 6 hours orally

B <u>Intramuscular, Intravenous</u>

1 *Adults*

a Initial dose of 3 to 5 Gm (45 75 gr) of any sulfonamide (sodium salt) except sulfanilamide followed by 2 to 3 Gm *(30 45 gr) every 6 to 12 hours (optimal interval to be* determined by blood level just before second dose and occasionally thereafter)

b Diluent may be physiological saline solution *Ringer's* solution 1/6 molar sodium lactate solution or Ringer's lactate solution

c Concentration *ideally approximately 0 5 per cent* but may be as high as 5 per cent

2 *Children* As in adults Initial dose 0 03 to 0 05 Gm (1/2 3/4 gr) /lb body wt (0 066 to 0 11 Gm /Kg) of any of the sulfonamides except sulfanilamide followed by 0 015 to 0 03 Gm (1/4 1/2 gr) /lb body wt (0 033 0 066 Gm /Kg) *every 6 to 12 hours*

<u>Toxicity and Management</u>

A <u>Toxic R tions.</u>

1 Mild Continue therapy *if necessary Symptoms include* nausea vomiting h adache dizziness crystalluria

2 Moderate Stop therapy unless continuation is essential to *life Symptoms include fever rash stomatitis conjunctivitis arthritis diarrhea microhematuria psychosis*

3 Severe Stop therapy and push fluids Symptoms include granulocytopenia *hemolytic anemia* aplastic anemia thrombocytopenia hepatitis exfoliative dermatitis *severe* hemat ria oliguria leukemoid reaction

B <u>Allergic Reactions</u> A consid rable percentage of individuals who have previously received sulfonamides *especially for* more than 7 days become sensitized and may develop

Immediate and severe reactions on readministration Fever angioneurotic edema urticarial and other rashes and peri arteritis nodosa may oc ur
Hist ry of previous administration should be obtained Cross sensitivity to various s lfonamides may exist Severe symptoms may be avoid d by giving a t st dose of 0 5 Gm (7½ gr) and observing for 6 hours

C <u>Pre ti ns</u>

1 Hemoglobin determination and white blood cell count every other day Differential if WBC is l ss than 6000 Discon tinue sulfonamides if granulocyt count is l s than 50%.
2 Daily fresh urine f r pH (use nitrazine pape) and sedim nt Increase alkali (odium bicarbonate) if pH is les than 7 0 Disconti nue drug if red blood cells are found in urine (see above) Increa e urin output if less than 1500 cc pe day or crystall ria occu s (mu t be examined for in a fresh specimen)
3 Daily observation of patient fo drug fever rash jaundice nausea vomiting etc

<u>Contraindi ations to Sulfon mid</u>

1 Hi tory of previous v re rea tion
2 Renal insuffi iency (Very small dos s may be used with caution)
3 Live damage (Proceed with ca tion if ess ntial)
4 Heart fail re (If sulfonamides are absol tely nec ssary substitute potassium bicarbonate for sodium bi arbonate a alkalinizing age t)

PARA AMINO SALICYCLIC ACID (PAS)

Para mino salicyclic a id (PAS) and it sodium salt have been found to e ert considerable tuberculostatic activity Tubercle bacilli resistant to streptomycin may be susceptible to PAS and vice versa The imultaneous admini tration of PAS and streptomycin delays th emergen of strains of tubercle ba illi resistant to the latt In addition to the bacteriostatic effect a tipyretic activity is pres nt

PAS is absorbed readily from the ga trointestinal tra t Peak serum concentrations are reached in 30 to 60 minut s and minimum levels are again rea hed in 4 hours PAS may be administ red in travenously and subcutaneously

<u>Dosage</u>

A <u>Oral</u> 2 to 3 Gm (30-45 gr) every 4 hours
B <u>Intravenous</u> 12 Gm in 3% solution given in 2 dose 4 hours apart 5 mg of heparin should be added t ach lit r

<u>T ity</u>

Na sea vomiting dia rhea drug fever dermatitis crystal luria hematuria and hypoprothrombinemia may be observed Ga trointestinal symptoms may apparently be avoided by parenteral administration of sodium PAS

ISONIAZID (INH)

Isoniazid (INH) and related compounds possess considerable tuberculostatic activity Cross resistance to streptomycin and PAS does not exist Bacterial resistance to INH develops rapidly INH is readily absorbed from the gastrointestinal tract and distributed throughout the body fluids including the cerebrospinal fluid

Dosage
Isoniazid 3 to 5 mg (1/20 1/12 gr) /Kg body weight per day divided into 2 or 3 doses and given orally

Toxicity
Constipation difficulty at micturition increased reflexes postural hypotension and dizziness eosinophilia slight anemia occasional casts and trace of albumin in the urine reducing substances in the urine

PENICILLIN

Penicillin is prepared from the cultural products of the molds Penicillium notatum and Penicillium chrysogenum The commercially available preparations are crystalline sodium calcium potassium and procaine salts of penicilloic acid

Four types of penicillin F G X and K are produced by the mold Commercial penicillin is principally penicillin G Penicillin X which occurs only in small amounts exhibits a slightly different range of antibacterial activity Penicillin K becomes bound to serum protein and is relatively inactive therapeutically

The Oxford and International units of penicillin are measured in comparison to the bacterial inhibitory power of a standard penicillin Crystalline sodium penicillin contains approximately 1500 units per milligram Dried crystalline penicillin retains its potency indefinitely but watery solutions may deteriorate especially when not refrigerated

Indications and Antibact ri l Spect um (See table p 514)
Penicillin exerts bacteriost tic and bactericidal activity against a wide variety of pathogenic agents but the susceptibility of these agents to penicillin may vary considerably Clinical response of infections may be predicted with f ir accuracy by means of in vitro sensitivity tests of the infecting organism This procedure should be performed when expected therape tic response does not occur or in the case of infections due to organisms such as staphylococci or Streptococcus fecalis many strains of which are naturally resistant to penicillin

Penicillin is indicated when infection with an organism known to be generally susceptible is diagnosed or presumed Hence one treats a specific infection not a disease e g pneumococcal pneumonia not pneumonia streptococcal pharyngitis not acute pharyngitis For specific indications see under disease in question

Mod of Action, Resista ce,
Penicillin is both bacteriostatic and bactericidal Its exact

mode of action is not known but in some way it apparently interferes with the reproductive process of orga isms

C rtain organisms produ e penicillinase which inhibits penicilln activity This m y occ r naturally as in the case of E coli and some strains of staphylococ i or may be an acquired characteristic of once s sceptible organisms e isting in sublethal conc n trations of penicillin Those varia ts of the original organism which we e nat rally resistant s rvive and multiply whil the susceptible organisms are destroyed *Acquired penicillin resistance* is not commonly encountered clinically

Ab rption, Di tributi , E c tion

A Ab rption P nicillin in wat y solution is rapidly abs bed wh n dminist red intravenously o intramuscularly and somewhat more slowly absorbed after subcut neous injection The peak conc tration in the blood is reached imm di t ly after intravenou inj ction and within one hour after intramu ular i j ction Blood levels persist f r from 2 to 3 hours after doses of less than 50 000 nits intramusc larly and somewh t longer with larger doses Pe icillin p ocai e s sp nsions p oduce measurabl serum conc ntrations f 12 to 48 hours and for 96 hours when combined with 2% aluminum monost rate Benzathcil penicillin may produce m surable serum conce tration for on month after injection of 600 000 to 1 200 000 units With all r pository forms maximum serum concentrations t nd to be l wer tha with aqueou sol tions and so ar not appropriate where high serum concentration is desirable Peni illin while not absorbed from th st m h is absorbed readily from the small int stine Approximat ly 5 tim s the intramu la dose m t be given to produ e comparabl blood l vels A is ids and buffers tend to decrease the de tructive ffect of gastric juic s and ab orption is best when the stoma h is empty Penicilli is poorly absorbed from the rectum and inconstantly beorbed from the vagina

The conc ntration of penicillin in serum and other body fluids m y be m red by va iou bio assay method Determination of blood levels and compari on with the in itro sensi ti ity of the o gani m re useful in infections due to resistant organi ms

B Di ribution Peni illin i d tributed throughout the body fluids but pene rates the joint pleura peritoneum and subara hnoid spa e irregula ly P netration i more l kely t occu if inflammation exi ts Penicill. G diethylaminoethyl st hydriodide (tope h o-penil[8]) ppe rs in higher concentrations tha penicillin G in the lungs and sputum Penicillin persists in the tissues f r a considerabl tim aft it has d.s ppe ed from the blood, hence ontinuous blood levels are not nec s ry in most inf tions Organi m exposed to pen. illin do not mult ply for considerab t.m after xposure

C E retion Peni illin i excreted principa y in the rine 8?% of u inary excretion is tubu a and may be partly blocked by such agents as caronamide para-am nohippuric a id Diodra t[8] and Benemid[8]

Preparations

A Commercially Available Preparations Include

1 Crystalline penicillin (sodium potassium salts)
2 Penicillin procaine in oil
3 Penicillin procaine in oil with 2% aluminum monostearate
4 Penicillin procaine in aqueous suspension (may be combined with crystalline penicillin sodium)
5 Penicillin tablets with or without buffers and bindings (50 000 to 200 000 units per tablet) and benzathacil penicillin suspension (60 000 units per cc) for oral use
6 Penicillin powder for insufflation (50 000 units per cartridge)
7 Penicillin in ointments in various bases (general and ophthalmic) (500 2000 units per gram)
8 Penicillin G diethylaminoethyl ester hydriodide (estopen Neo penil®) 500 000 units per cc

B Strength of Solutions and Suspensions

1 Crystalline peni illin is generally given in a concentration of 10 000 units per cc but may be much more concentrated
2 Penicillin for subarachnoid injection should not be more concentrated than 1000 units per cc
3 Penicillin procaine complex in aqueous suspension may be prepared in concentration of 300 000 1 200 000 units per cc

Dosage and Methods of Admini tration

A Intermittent Intramu ul r. Penicillin in aqueous solution may be given in doses of 5000 to several million units every 3 hours intramuscularly This remains the method of choice in most severe acute infections In many infections equally good results may be obtained by administration of 100 000 to 300 000 units every 12 hours intramuscularly Intramuscular injection of 300 000 to 600 000 units of penicillin procaine may be given every 24 hours Penicillin procaine in oil with 2% aluminum monostearate produces measurable blood levels which may persist as long as 96 hours Benzathacil penicillin 600 000 to 1 200 000 units produces measurable serum concentrations for one month and is ideally suited to prophylactic use These preparations are highly satisfactory except in the most severe acute infections

B Continuous Intramus ular and Continuous Intravenous. Where very high doses of penicillin are necessary in the treatment of infections due to resistant organisms administration by continuous drip is often advantageous Many million units dissolved in 1000 to 2000 cc of physiological saline or 5% glucose solutions may be given by indwelling needle or catheter in 24 hours The intramuscular site should be changed as frequently as irritation occurs Thrombophlebitis as a complication of intravenous administration may be avoided by changing the vein used or by addition of 10 mg heparin sodium to the solution

C Oral. Penicillin may be given orally in all but the severest of infections or oral medication may be substituted for parenteral after initial response to treatment Doses of 100 000 units every 3 hours to 300 000 units every 6 to 8 hours may be given

D Topical

1 Aerosol 50 000 to 100 000 units may be aerosolized from

3 to 8 times a day A solution containing 50 000 units per 0 5 cc may be nebulized by means of Vaponephrin® or De Vilbiss #40® nebulizers Forced deep inhalation followed by retention of the inspired penicillin as long as pos ible should be insured Hand pumping or compress d gas fed through a Y tube may be used to nebulize the solution Penicillin powder in cartridges containing 50 000 units may be used similarly by m ans of the Abbott Aerohalator® or the Squibb Dispolator® While local effect in the respiratory passages for the treatment of bronchiectasis chronic bronchitis etc is usually the obj cti e appreciable blood concentrations of penicillin frequently result S nsitiza ion occurs commonly

2 Intrathecal Although penicillin may penetrate the subarachnoid space after in ramuscular injection this phenomenon is inconstant and may be delayed Therefore in meningitis due to susc ptible organisms 10 000 units of penicillin dissolved in 10 cc of physiological saline sho ld be administered once a day until the cerebrospinal fluid g ucose content becomes normal Penicillin should also be given intramuscularly

3 Intrapleural intra articular 10 000 to 200 000 units of penicillin may be introduc d into joint or pleural spaces infected by susceptible organisms daily or every other day following aspiration

4 Oral Troches of penicillin may be dissolved slowly in the mouth in the treatment of Vincent s stomatitis and pharyngitis This form of therapy is valueless in other forms of pharyng tis and may produce stomatitis

5 Wounds and skin Solutions of penicillin containing 200 1000 units per cc may be used as a w t dressing in inf cted wounds Penicillin is of no value a an irrigating solution because of the nec ssity of prolonged conta t to produce antiba terial effect

Ointments of penicillin incorporated in various bases may be used on infections of the skin due to susceptibl organisms

Toxi ity

Since the purification of penicillin true toxic reactions are almost unknown Sensiti ation may be pre-existing or induced Fever and rashes especially urticarial may appear d ring the course of penicillin administration or as long as several w eks later This may xactly mimic serum sickness True idiosyncrasy to penicilli is rare and may be la gely limited to individuals suffering from dermatophytoses Desensitization may be attempted Patients known t be sensitive to penicillin may be treated with penicilli O or allylmercaptomethyl penicillin G which may be substituted for aqueous and proc ine peni illin respectively in the same dos s Cross-sens tivity occurs occasionally and should be guarded against

STREPTOMYCIN

Streptomycin is prepared from the cultural products of Streptomyces griseus Commercially available salts include the sulfate hydrochloride and the calcium chloride complex Dihydrostreptomycin may be used alternatively with streptomycin Vestibular damage is less frequent following dihydrostreptomycin therapy but deafness occurs more often following prolonged dihydrostreptomycin therapy than st eptomycin treatment One microgram (γ) equals 1 Waksman unit and 1 Gm equals 1 000 000 Waksman units

Indications and Antibacterial Spectrum (See table p 514)

Streptomycin is principally active against gram negative organisms but possesses signifi ant activity against some strains of gram positive cocci Penicillin and streptomycin exert marked synergistic activity in infections due to Streptococcus fecalis and streptomycin and Aureomycin® exert synergistic activity in brucellosis Mycobacterium tuberculosis is highly susceptible to streptomycin

The indications for streptomycin are almost entirely limited to infections due to gram negative organisms and tuberculosis For this reason exact etiological diagnosis should be sought before instituting treatment Streptomycin should be reserved for those cases of tuberculosis where a conservative rest regime would not be expected to produce good results Combination with collapse therapy and surgical procedures often is of aid Most tubercle bacilli become streptomycin resistant within 3 months of the beginning of treatment altho gh the simultaneous use of PAS may delay this event

Mode of Action, R sistance

Streptomycin is both bacteriostatic and bactericidal Its mode of action is unknown Resistant variants of organisms may multiply quickly in infections treated with streptomycin so that further therapy with the antibiotic is useless Streptomycin should be used only when necessary and ad quate initial dosage should be used to prevent development of drug resistance

Absorption Dist ibution, Ex retion

A Absorption Streptomycin is readily absorbed from the site of intramuscular injection The peak serum concentration is reached within one hour and detectable amounts are present up to 6 hours later It is likely that streptomycin persists longer than this in the tissues If streptomycin is administered every 3 to 4 hours gradually increasing serum levels will be noted due to slow accumulation Administration every 6 hou s is sufficient in all but the most acute infections in which cas s the drug should be given initially every 3 or 4 hours Streptomycin is not absorbed from the gastrointestinal tract but exerts bacteriostatic activity in the lumen of the bowel

B Distributio . Streptomycin is distributed throughout the body similarly to penicillin Penetration of the cerebrospinal fluid is inconstant and unreliable

C Excretion. Streptomycin is excreted principally in the urine where the concentration exceeds that in the serum

Dosage and M thod of Administration

A. I m t lerc lou Inf i on. 1 to 5 Gm daily may be given in tramus ula ly in d vided dos s very 3 to 6 hou s. Most e t gen ralized infections require approximately 3 to 4 Gm per day. U inary tract inf tions du to highly s s eptible o gan isms may be treat d with 250 mg intram sc la ly every 6 hou s for 3 to 5 days. Streptomycin should not be used in the pres nce of obstru tion of the urinary tract bec s of th nea c rtai ty of the development of resi tant organisms.

B. M i giti. In addition to intramus la administration 25 to 50 mg d l d in 10 of physiologi al aline solution may be gi n i t athecally onc daily until th rebrospinal fluid sugar content becomes normal.

C. Ba illary Dy t. Streptomycin may be admini tered orally 0 5 Gm (7 1/2 g) e ery 6 hours in the t eatm nt of shigella dys nt y.

D. Tuber ul s s. 0 5 Gm of streptomycin and 0 5 Gm of di hydrostreptomy in intramuscula ly twi e w ekly is indi ted in on-di s minat d f rms of t bercul sis. In a t c e s of t berculous pneumonia and miliary tuberculosi 40 mg /Kg of body wt (20 mg /lb) daily hould be gi . In t berculous meningitis 60 mg /Kg of body wt (30 mg /lb) daily hould be administered intram ula ly in ddition to 2 mg /Kg of body wt (1 mg /lb) pe day intrath cally (se T berculou M ingitis p 467)

T xi it

I nful local re ction are uncommon t pres nt. Drug rashe of m ny sorts occ drug f ver may be obs rved nd light nausea nd dizziness a f eq nt. Eosinophilia may be noted but appe rs to ha e no signifi nc . Cylindruria and nitrog n ret ntion not s ociat d with permane t renal damage have been reported. Ve t bular damage of s manif sted fi st by tinnitus and charact ri d by severe vertigo nd ata ia f llow high o prolonged dosage. If streptomy in i dis ontinued immedi tely recovery u uall follows. If ve tibular damage be om s permanent satisfa tory compensat on i usually m de by the patient. Dea. also may oc r but it rare. V tibul apparat depre ion is le s common with di hydrostreptomycin but de f ss may de lop aft tre tm nt has been stopped. The use of ombined streptomycin and d hydro s reptomycin in equal pa ts educe the incidenc of de fnes and ve t bula damage. Pleocyto is increa in prot in cer nt of the pinal fluid subara hnoid block or my litis may follow pro onged intra hecal dminis rat on of st eptomycin.

CHLORTETRACYCLINE (AUREOMYCIN®)

Chlort tra yc ine (A reomy i ®) is pr pared from Strepto my es a eofa iens. It i availab a the hydrochloride.

Ind tions nd Adv ta es (t 1 Spec rum). (See table on p 314.) C lorte ra yc ine (A eomyc n) a a ternative t peni illin or s reptomycin in most ba te ial inf ctions. It i a broad

spectrum antibiotic with a wide therapeutic range It is active against most gram negative rods and gram positive cocci the spirochetes of leptospirosis relapsing fev r rat bite fever syphilis and yaws as well as the rickettsiae of typhus Rocky Mountain spotted fever scrub typhus Q fever and rickettsialpox It is highly active against the viruses of psittacosis lymphopathia venereum primary atypical pneumonia and probably herpes zoster

Absorption Excretion

Chlortetracycline is absorbed slowly from the gastrointestinal tract and peak blood concentrations are reached in from 2 to 4 hours and persist as long as 12 to 24 hours depending on the dose Intravenous administration prod ces an immediate high blood concentration which drops over a period of 6 to 24 hours varying with the dose Chlortetracycline is poorly absorbed after muscular injection unless hyaluronidase is added Accumulation occurs in the body at high dosage so that blood levels become increasingly elevated during prolonged administration at high dosage Chlortetracycline is excreted slowly by the kidney It does not appear readily in the cerebrospinal fluid or pleural fluid but it is present in high concentration in the urine and stools

Dosage

A Oral. 0 25 to 1 0 Gm may be given orally every 6 hours in systemic infections and less frequently (every 8 10 hours) in urinary tract infections

B Intrav no s. Similar results may be obtained by the intravenous administration of 100 mg every 6 to 8 hours or 500 mg every 12 hours In resistant infections combined oral and intravenous therapy may be used

C Intramuscular. 250 mg in 1% procaine solution with 250 units of hyaluronidase added every 6 hours may be substituted for intravenous therapy when required

M thod of Admi i tration.

250 mg orally every 6 hours appears adequate in most acute infections Gastrointestinal symptoms may be minimized by administering the drug only when food is in the stomach or by simultaneously administrating carboxymethylcellulose Superinfections with yeast in the oropharynx and perineal area may occur but are probably secondary infections of local sensitivity reactions

Toxicity

Naus a and vomiting are common following oral administration but this may be avoided by reducing the dose to 250 mg every 8 hours or administering the drug intravenously Rashes and stomatitis may occur Loose bowel movements may be observed

OXYTETRACYCLINE (TERRAMYCIN®)

Oxytetracycline (Terramycin®) is derived from Streptomyces rimosus The commercial preparations are the hydrochloride and the base

Indi ations and Anti inf tiv Spectrum (See table on p 514)
Oxyt t cy lin is a b oad spe t um antibiotic whos range of activity is simila t that of chlort tracycline It may be used in inf ctions due to gram positive and gram negative cocci gram positi e and gram n gative rods spirochetes rick ttsia and the viru es of primary typical pneumonia lymphopathia v nereum and psittac i

Ab rption and E retion
Oxyt t ycline is incompl t ly absorbed from the gastrointes tinal tra t Sati fa tory serum lev ls may be maintained by admin istration ev ry 6 hou s Excretion is principally by the kidneys Significa t amounts appear in the bil Appearance in the cerebro spi al fluid is delayed and irregular

Dosage nd Rout of Admi i tration
A Oral 0 25 to 1 0 Gm may be gi n orally v ry 6 hours
B I ra no 0 5 to 1 0 Gm dis ol ed in sodi m glycinate buff I tion m y be adminis ed e ery 12 hours Oral th rapy hould be us d when ve possible
C I ram lar The p eparation fo I M us may be given in a dose of 0 5 mg ev ry 24 hou s or 0 1 Gm ev ry 6 hours

Toxi ity
N e omiting diarrh a stomatitis and derma itis occur occa onally H patitis m y re lt from p olonged intravenous treatm nt at high dos ge Thrombophl bitis may res lt from intra venous admi i tration S perinf ction with r sistant staphylococ i may occu ually as a s vere e t rocolitis

TETRACYCLINE
(ACHROMYCIN® TETRACYN®)

T tra ycl.ne i produc d by removing the hl ri from chlo tetra ycline Its properti s clos ly e mbl thos of chlortetra cycline and oxyt tra ycli e It is mo e stab. in solution than e ther derivative

Indi tions nd A ti infecti Spectrum (Se table on p 514)
T tra ycline a b oad pe trum ntibiotic whose fi ld of acti ity is imila to those of chlortetracycline and oxyt tra ycline Susceptib.lity of strains of bacte ia may d.ff among th three drugs howev r

Absorpt on nd E retion
T t ycline absorbed and xcreted simila ly to chlortetra ycline It may d.ff se more read ly into the c rebrospinal f.u.d

Dosage and Rout of Admin strat on
A Ora. 0 25 to 1 0 Gm very 6 hours
B Intravenou. 0 5 to 1 0 Gm every 12 hours
C I.....ar 0 1 Gm every 8 12 hours

Toxicity

Similar to that of chlortetracycline and oxytetracycline but significantly less frequent

CHLORAMPHENICOL (CHLOROMYCETIN®)

Chloramphenicol (Chloromycetin®) originally prepared from Streptomyces venezuelae is also produced synthetically

Indications and Anti infective Spectrum (See table on p 514)

Chloramphent ol is active against a wide range of bacteria the rickettsiae and the viruses of lymphopathia venereum psittacosis and primary atypical pneumonia Generally speaking it is more effective than hlortetracycline and oxytetracycline in typhoid fever app oximately equal in effect against other gram negative organ isms spirochetes and rickettsiae

Absorption and Ex r tion

Chloramph nicol is rapidly absorbed from the gastrointestinal tract reaching a peak serum concentration within 2 ho rs Ab sorption following rectal administration is slightly less efficient 0 5 Gm may be administered intramuscularly or intravenously every 6 hou s Excretion is principally by the kidneys and high conc ntrations are reached in the urine

Dosage and Route of Administration

A Oral, 50 mg /Kg (23 mg /lb) per day (100 mg /Kg or 45 mg /lb per day in hildren) administered every 3 to 6 hours Reduce by one half followi g defervesence

B Re tal, 125 to 150 mg /Kg (56 70 mg /lb) per day in children every 6 hours Capsule should be punctured before ins rtion

C I tram cul r nd intrav nous, 500 mg every 6 hours

Toxicity

N usea and vomiting diarrhea nervous depression and der matitis occur occasionally Granulocytopenia and aplastic anemia oc ur occasionally and chloramphenicol should therefore be used only on definite indication

TYROTHRICIN

Tyrothricin is prepared from Bacill s brevis It is used topically as an ointment or watery suspension It is active only against gram positive organisms Because of toxic effects on par enteral administration its use is limited entirely to the topical treatment of infected wounds and pyoderma

POLYMYXIN (AEROSPORIN®)

The polymyxins of which B D and E have been given clinical rial are derived from Bacillus polymyxa and related organisms

Indi tions and Antimicrobial Spectrum (See table on p 514)

With the exc ption of mo t strain of Prote s vulgaris poly myxin is bact ricidal against gram negative rods Most strains of Pseudomonas aeruginosa (pyocyaneus) are highly su ceptible to polymyxin P lymyxi is indicat d in severe systemic infections due to gram negative rods particula ly infections du to Pseudo monas eruginosa which do not re po d to oth forms of chemo therapy It may be used as a local application in wounds infected with susc ptible organisms It may be given orally in the treatment of shigella ent ritis or in the manageme t of the ca ier state

Ab rption d E r tion

Abso ption i rapid aft intramuscular injection Excretion is largely by the kidney and high concentrations are achieved in the urin Polymyxi is not b orbed from the gastrointe tinal tract and when it i gi en by mouth it exhibit its principal activity in the lum n of the bowel

Dosage

A I am s lar 1 5 to 2 5 mg /Kg of body wt divided into 3 or 4 doses

B Oral 20 mg /Kg of body wt /day given in 3 or 4 do s

T xicit

Most to ic ef ct occ at dosage levels over 2 5 mg /Kg of body wt /day Albumin ria and nitrogen ret tion are usua ly re ve b. Weakne s drowsine ataxia numbness of the fingers and f t impat ed position se se bl rri g of the ision diplopia and nys agmus may oc ur Alle gic re ctions such as itchi g chilly sensations sw ti g and rashes ar obs rved Irritation at the s te of i tramus ular i je tion is common

BACITRACIN

Ba itra in is derived from the growth products of Baci. u s bt is

In tions nd A imi robi l Spectrum (See tabl on p 514)

Bacitra in is tive gainst g m positive occi and spirochet s Its a tion i principa ly bact ri idal Synergi ti a tion with peni ill. and other bact ri idal a tibiotics has be n d mon trated ainst staphy.oco i and othe organi ms Bacitracin is princi pal.y used opi ally f local i f tions due to susceptible organi ms but it may be sed parent rally in th treatm t of infections re s ant t othe a .ibiot s or in combinat on wi h other antibiotics s one of a synergis c pa It may be used o a ly in the treatm t of amebic colitis

Dosage

A Topic l Solution or ointments cont ining 500 units per cc

B In... 40 000 t 120 000 units in ivided dos s daily f r 5 to 20 days

C Intramuscular 2500 to 20 000 units every 8 hour

Toxicity

Albuminuria cylindruria and nitrogen retention commonly occur after parenteral administration

NEOMYCIN

Neomycin is derived from Actinomyces fradii

Indications and Antimicrobial Spectrum (See table on p 514)

Neomycin is most active against gram negative rods b t is also active against many strains of gram positive cocci particu larly staphylococci as well as gram positive rods Many strains of Proteus vulgaris are sensitive to neomycin Its principal use is local in the treatment of infections due to susceptible organisms but it may be used occasionally parenterally in the treatment of in fections due to organisms resistant to other antibiotics or may be used as one of a synergistic pair It may be used orally to sterilize the bowel before gastrointestinal surgery and in amebic colitis

Absorption and Fxcretion

Neomycin is readily absorbed after intramuscular injection It is poorly absorbed from the gastrointestinal tract It exerts its principal activity in the lumen of the bowel when given orally Neo mycin is principally excreted by the kidney and appears in the urine in high concentration

Dosage

A Topical Ointments containing 1000 units per gram or solutions containing 200 units per cc may be used locally
B Oral 50 000 units every 6 hours
C I tram scular 100 000 units to 200 000 units daily divided into doses at 6 hour intervals

Toxicity

Renal damage manifested by albuminuria Nitrogen retention may occur Deafness may follow parenteral administration

ERYTHROMYCIN (ERYTHROCYN®)

Erythromycin is a medium spectrum antibiotic derived from Streptomyces erythreus Its action may be bactericidal or bacter iostatic depending on the susceptibility of the bacteria Resistan e to erythromycin may develop rapidly under certain circumstances most notably by staphylococci

Indic tions and Antimicrobial Spectrum (See table on p 514)

Erythromycin is active against most strains of gram positive cocci gram negative cocci C diphtheriae H influen ae H pertussis and brucellae Activity has also been shown against the viruses of lymphopathia venereum and psittacosis and the rickettsia of typhus Erythromycin may be used in infections du to these organisms as an alternative to penicillin and other antibiotics

Rout of Administration and Dosage
A Oral 0 2 to 0 5 Gm e ery 6 hours
B I tra ou 0 5 Gm ev ry 12 hours

Toxicity
N usea vomiting and diarrhea occur occasionally

CARBOMYCIN (MAGNACYCIN®)

Carbomycin is a medium spectrum antibiotic derived from Streptomyces halst dii It is principally active again t gram positive coc i but is also active gainst large virus s rickettsiae and E histolytica

The indi ations f carbomycin are not established It may exert therape tic effect in infection of the hepatic biliary tract by susceptible organisms including E histolytica

Absorption nd E cretion
Ca bomy in is bso bed from the gastroint stinal tract and excre.ed promptly in high concentration in the bile Little appears in the s rum o uri e

Dosage nd Indi tions
1 Oral 0 5 Gm every 6 hours
2 I travenou 0 5 Gm every 12 hou s

TABLE OF SUSCEPTIBILITY OF MICROBIAL PATHOGENS TO CHEMOTHERAPEUTIC AGENTS

Data are p incipally based on availabl li ical xperienc and to a le en in vitro te The dr g of hoi li ted may be supplanted f rthe xperience m lat a

Drug of hoic O	N ignific nt activit y	(S)	Sulfones (Promi le® Promin®)
Alternative drug V	Significant variation in susceptibili y of rains	C	Combined therapy
W k activity or inconclus dat ?	N data vailabl		

Organism	Di es Infections	P ni illi	S repi my in	T ra y li Gro p	Chlo mph i ol	Eryth myci	P lymy i	S lfonamide	Ba i ra i	N omyci
S hemolyti us	S ppurati ons	++	V				O			V
St virida	S ppu tions		±V				O	±		V
St fec li	Suppuration	VC	VC				O	±		±V
Staph ur us	S ppura on	+VC	±VC	V	V		O			V
St ph lbus	Suppura ions	V	±V	V	V		O			V
D pneumon ae	Pne mococcal		±V				O			V
Clost id um group	T nd ga gangrene		O			?	O			V
C diphtheria	Diphtheri		O	+			O	O	?	V
B hra i	An hra (Ra)		?				O		?	?
B ub ili	(Rare)	+					?		?	?
N gono he	Gonor he						O		O	±
N meni giti di	M ni gi i	C	O				O	+C	O	±
H influe zae	Influe zal	O							O	V
H pert i	Whoopi g ough	O							O	V
H duc yi	Chanc i	O				?			O	V
K pne monia	F iedland pne monia	O		V	V	±V			O	
E h oli (B oli)	S ppu ons	O				O			O	
A rogene	S ppura ion	O	+			O			O	
P lgaris	S ppura ion	O	V	V	±V	V	O		O	
P g nosa	S ppu tions	O	±V	±V	V	V		±	O	V
S typhi	Typhoid f	O	O	±		O		O	O	V
Salmonella gro p	Para yph id fev	O	O			O		O	O	V
Si gella dy i ia group	Ba illa y dys t ry	O				O			O	V
P t tula i	Tularemia	O				?	?	O	O	
P i pe ti	Plagu	O				?	?		O	
Bruc lla group	Undula fev	O	C	C					O	
Ba t funduliformi	S ppura ions		?		?	?	?	?	?	?
St p oba ill moniliformi	Ha hill f		?		?	?	?	?	?	?
A bovi	A inomyc i	++	O		?	?	O		?	?
E y pelothri h i pathi	E y ipel id		?	?	?	?	?	?	?	?
T pallid m	Syphilis	++					?	O		
T pe	Y w	+	±				?	O	+	
Bo re re ti	Relap i g f ve		O	++				O		
Spirill m mi	Ra bi fev		O				?	O	?	
Lept pi a i t ro h mo hagia	W il' di	+	?		?		?	O	?	+
Myc tuberc losi	Tube ulosi	O		±			?	(S)	O	
My l p	Leprosy	O		?	?	?	?	(S)	O	?
P ittacosi iru	P itta osi		O	++			O	±	O	O
Lymphopathia venereum i	Lymph pathia nere m	±	O				O		O	O
P ima y typi l pneumonia irus	P im typi l pne m ia	O	O			?	O	O	O	?
Donovan body	Gra uloma i guinal	O	+			?	?	O	?	?
Ri k ttsia (entire group)	Typhus d poti d fev	O	O				O	O	O	O

Chapter 20

DISEASES OF UNKNOWN ETIOLOGY

A variety of names (collagen dis ases diff se vascular diseases visceral angiitides diffuse connective tissu disease) have been given to a group of diseases which appear to have in common a p th ological involvement of mesenchymal tissues Rheumatic fever rheumatoid arthritis diss minated lupu erythem tosus p riarter itis nodosa scl rod rma dermatomyositis acrocyanosis (acro- s lerosis) and perhaps glomerulonephritis are the chief m mbers of this group of rather ill defined but probably related diseases of un known etiology The diff rentiation of these disorders sometimes poses a real clini l problem and in many instances the diagnosis can be established only aft r long continued and painstaking ob vation (see page 520) There is some evidenc that hypersensitivity is commor denominato in etiology although the pathologi al re action in the connective tissue is p obably aused by a wide variety of injurious agent

Clini l Findings

Cert in clini l f ture ar common to many of th collagen dis ases although there m y be considerable va iation in the s verity stent and frequency of manifestations

A. Cut neous Lesion Butt rfly ra h, e ythem multiforme and nodosum
B. Hemorrh gi Phenomen Purpura, hemorrhag
C. Arti cul M f on Syn viti arth iti arthralgia
D. Ca d l nvolvement Pancarditi pe icarditis myocarditis endocardi co onary art ry diseas
E. V scul M nif tation Arterial hypertension Raynaud s phenomenon
F. Lymphatic Involvement Lymph denopathy and plenomegaly
G. Se ous Invo vemer Polyserositis pleurisy peric ditis pe t onit
H. Neurom ul Manif t tion
I. Hem o g Change Anemia leukocytosis or leukopenia
J. Ren l ve vemen
K. S mic or Con t tion l M fes ation F ver weight loss f tigue

Labor ory Findings

Labor ory ocies which often ar of special diagnostic sig nificance a

A. Skin Biopsy Characteristic histologic hanges may be observed in som of these onditions

B <u>Muscle Biopsy</u> Characteristic histologic changes occur in periostitis and dermatomyositis
C <u>Lupus Erythematosus C ll Demonstration</u> *These characteristic* polymorphonuclear leukocytes (with round vacuole partially filled with nuclear material) in marrow and peripheral blood smears point relatively specifically to disseminated lupus
D <u>Antistreptolysin Titer</u> Demonstration of changing A S titer may provide etiologic information regarding background of previous streptococcal infection which is of especial value in the diagnosis of rheumatic fever

Rheumatic fever and Sydenham s chorea will be discussed in dividually The treatment of other diffuse collagen diseases will be discussed collectively Acrocyanosis (acrosclerosis) has been in cluded in this group for purposes of differential diagnosis although it is doubtful that it *is a true member of the collagen disease group* Rheumatoid arthritis has been dealt with in Chapter 12 (see pag 311) glomerulonephritis in Chapter 11 (see page 293)

RHEUMATIC FEVER (code No 010 932)

A generalized disease of unknown etiology usually coming on 1 3 weeks after an acute infection with the hemolytic streptococci and manifested usually by pathological changes involving the h art blood vessels and serous surfaces primarily the joints It has a marked tendency to recur

<u>Diagnosis</u>

The diagnosis of active rheumatic fever can usually be made if the patient has 2 major manifestations or 1 major and 2 minor manifestations of the disease (Jones)

A <u>Major Manif stations</u>
1. Definite past history of rheumatic f ver
2. Signs of active carditis (including Ecg changes)
3. Inflammation of joints
4. Subcutaneous nodules
5. Chorea

B <u>Minor Manifestations</u>
1. Fever
2. Erythema multiforme
3. Abdominal pain
4. Precordial pain
5. Non traumatic nose bleed
6. Purpura
7. Pneumonitis

C <u>Laboratory T sts</u> May show increased sedim ntation rate an incr a d antistreptolysin titer leukocytosis and anemia and abnorm l Ecg

<u>Treatment</u> (See page 168 for treatment of rheumatic heart disease)

A <u>Spe ific M a ures</u>
1. *Salicylate therapy* The salicylates markedly reduce fever alleviate joint pain and possibly reduce joint sw lling There is no evidence that they have any effect on the natural *course of the disease The salicylates should be continued as long as neces ary to relieve pain swelling or fever If withdrawal of the drug results in a recurrence of symptoms they should immediately be reinstituted*

a Sodium salicylate is the drug most wid ly used -
   (1) Dose 1 2 Gm (15 30 gr) every 2 4 hours orally The drug should be given in suffi ient doses to allay symptoms and f ver and it m y be necessary to give maximum doses to a hieve this result In an occasion al patient maximum doses may not be completely ef fective There is no evidence th t intravenous admin istration has any advantage over the oral route
   (2) Toxic reactions The early reactions incl de tinnitus nausea and vomiting Sodium salicylate may be given in enteric-coated 0 5 Gm (7½ gr) pills or with qual doses of sodium bicarbonate to r duce g stric irrita tion *Never use sodium salicylate or sodium bicarbonate in patients with acute rheumatic fever who have associated cardiac failure*
b Acetylsalicylic acid may be sub tituted for sodium sali cylate with the same dosag s and pr cautions
c Aminopyrine (pyramidon) If the salicylates are not toler ted this drug may be used in doses of 0 3 0 4 Gm (3 6 gr) every 3 4 hours Check the WBC every 3 4 days when giving this drug

3 The sulfonamide and penicillin should neve be used in the treatment of acute rheumatic f ver they are of no value and the sulfonamides may be harmful
   a *Prevention of relapse - There is some evidence that penicillin may prevent a relapse if used within 2 -4 hours after the onset of a streptococcal infection*
   b Coexisting inf ction If an acut infection occurs during an attack of rheumatic feve give antibiotic ag t as indicated (s e pag 314) but avoid giving sulfonamides

B General M sur s
   1 Bed re t should be enforced until all signs of a ti e rheu matic fever have disappeared The criteria for this are
      a. Return of the t mperature to normal with patient t bed re t and without medications
      b Norm l sedim ntation rate
      c Normal resting pulse rate (under 100 in adults)
      d Return of Ecg to normal or fixation of abnormalities
   2 G adual resumption of activities Patient may be allowed up slowly but several months should elapse before return to full activity unless the infection was e eedingly mild
   3 Maintain good nutrition

C Cortisone A etat and ACTH Although rather remarkable results have been obse ved in rtain acute rheumati fever patients t ted with these drugs such improvement i oft n only t mporary There may be a prompt disappearance of f ver malaise tachycardia, and polyarthriti Abnormal Ecg changes (prolonged P R int rval) and blood sedime tation rat may return t normal limits within a week Optimal dosage schedules and influence of the drugs on the d velopment of sub sequent cardiac le ions have not been establi hed

D Treatment of Complications
   1 Cong st ve fai ur t as as for congestive failure (see page 113), with the following variations

a Low sodium diet (see page 53) and mercurial diuretics (see page 204) are of particular value in promoting diu resis and treating failure in acute rheumatic fever
b Digitalis is generally not as effective in acute rheumatic fever as in most cases of congestive failure and the drug may accentuate the myocardial irritability producing arrhythmias that further embarrass the heart
c Many cases of congestive failure are due to acute myo carditis These cases often respond dramatically to corticotropin (ACTH) or cortisone When these agents are used for this condition maximal sodium restriction (under 200 mg daily) is imperative

2 Pericarditis Treat as any acute non purulent pericarditis (see page 188) The rheumatic effusion is sterile and anti biotics are of no value The general principles include re *lief of pain by opiates if necessary and removal of fluid* by cardiac paracentesis if tamponade develops If paracentesis is performed it should be preceded and followed by a short course of p nicillin therapy to prevent contamination of the pericardium ACTH and cortiso e as well as salicylates should be continued or started as they seem to have a speci fic and favorable effect in aiding resorption of the fluid

Prophylaxis

The principles of prophylaxis are to avoid hemolytic strepto coccal infection and to give immediate treatment with th antibiotic agents if a streptococcal infection occurs

A General Mea ures
1 Avoid contact with persons who have colds or upper respiratory infections
2 If possible li e in a warm climate

B Prevention of Infection Two methods of prophylaxis are now advocated
1 Penicillin Oral penicillin in doses of 100 000 units t i d (under 100 lbs weight) 200 000 units t i d (over 100 lbs weight) This is advocated especially for children who have had one or more attacks of acute rheumatic fever and should be given throughout the school year Adults should receive this for about 5 years after an att ck of acute rheumatic *fever* In any case it should be gi en to these individuals between September and June
2 Sulfonamides If penicillin is not available give sulfadiazine 1 2 Gm (15 30 gr) daily in divided doses from September to June *Patients receiving sulfonamides should have frequent blood counts urinalysis should be performed initially and at least every 4-6 weeks thereafter If there is any tendency towards leukopenia the drug should be stopped immediately*

C. Treatment of streptococcal sore throat should be carried out by use of the antibiotics It has been shown that prompt therapy (within 24 hours) of streptococc l infections by 300 000 600 000 units of aqueous procaine penicillin I M will prevent most at tacks of acute rheumatic fever If this proves true prompt penicillin treatment of any upper respiratory infection in sus ceptible individuals may be adequate prophylaxis

CHOREA (Sydenham s) (code No 930 196)

A l as c mmon manifest tion of heumatic dise se char c t ri ed pa hologi lly by g alized dem and cong ation of the brai and by in olvement of the b al ganglia with ascul r throm bi focal hemor hag s periva c lar infiltration and chromatolysis of n ve cells It occurs mo t f eque tly in fem les in th second d ade and is chara teriz d by jerky restless horeiform mov ments and t tim by dysarthria

Tr m t

A Spe ifi M asu s None known Corticotropin (ACTH) and corti one (pe to be of be efit in many cas s of cho ea It must be gi en in relatively high initial dosage and marked sod um restri tion must be employed

B F v the py m y be employed if all else f ils This m y be gi en by the of 2 m thods Hypertherm apparatus with t mper tur 39 5 40 5 C (103° 105 F) for 3 5 hou s twi w ekly f 6 10 t e tm ts or typhoid va in I V d ily for 5 7 d y

C Ge l M re

1 Gene l symptom ti m asur s and good nursing ca e are of most import nce
2 S d tion with Phe ob bital Phenobarbiton 15 30 mg (1/4 1/2 gr) t i d, q i d may be helpful
3 If convulsive s izur s appe r magnesium s lf te 4 10 cc (1 2 1/2 d) of a 10% lution I M or I V may be used When dminist ring magne i m sulf te I V always h ve a syringe filled with 10 of 10% solution of c lcium gluco nat or other calcium s lt r dy to administ r I V if n osis oc urs or r pir tion ce se

OTHER DISEASES OF UNKNOWN ETIOLOGY

OTHER VISCERAL ANGIITIDES (Diffuse Vascular Diseases ")

Acrocyanosis (cod No. not listed)
Diff e s l roderma (ode No 114 311)
Dissem.nat d lupus erythematos s (code No 110 1x0)
De m tomyositi (cod No 2 4 100)
Peri rt ritis nodosa (code No. 460 190)

Diagnosi

Se tabl on page 520

Tre ment

A Spec Mea ure None known The role of corticotropin (ACTH) and cortisone in the management of this group of dis e ses ha not yet been established, al though they seem to be the most ffective weapons availab In some cas s the f ct has been quite definit and dramatic, especially in the e rly phas of the illness Other pa ients have received t mporary benefit during acute episodes A few patients seem t be only deleteriousl y affected by these gents Suggested dos ge s hed ule are comparable to those employed in rheumatoid arthritis (see page 511)

Chapter 21

DISEASES DUE TO PHYSICAL AGENTS

DISORDERS DUE TO COLD

Exposure to cold produces immediate localized and then generalized vasoconstriction When the skin temperature falls to 25 C (77° F) tissue metabolism is slowed but the demand for oxygen remains greater than the slowed circulation can supply and the area becomes cyanotic At 15 C (59 F) tissue metabolism is markedly decreased and the dissociation of oxyhemoglobin is reduced giving a pink well oxygenated appearance to the skin Evidence indicates that tissue survival at this temperature is slight Tissue death may be caused either by ischemia and thromboses in the smaller v ssels or by actual freezing with the formation of ice in the tissues Freezing does not occur until the skin t mperature drops to −4 to −10 C (25 to 14 F) or even lower depending on coexisting factors such as wind immobility venous stasis malnutrition and occlusive arterial disease

Prophylaxis

1 W ar warm dry clothing preferably several layers to afford additional insul tion with windproof outer garment
2 Keep dry when possible remove wet clothing socks and shoes and replace with thoroughly dried ones
3 Avoid cramped positions constricting clothing and prolonged dependency of feet
4 E ercise arms legs including fingers and toes periodically to maintain circulation
5 Avoid wet and muddy ground and ke p sheltered from wind
6 Maintain good nutrition and le nliness of skin

CHILBLAINS (code No 0 -446)

Chilblains are red itching skin lesions usually on the extremities caused by exposure to cold without actual freezing of the tissues They may be associated with edema or blistering and are aggravated by the application of warmth In the chronic form ulcerative or hemorrhagic lesions may appear and progress to scarring fibrosis and atrophy

Treatment

1 Protect affected area from trauma and secondary infection
2 Do not rub or massage injured tissu s or apply ice or heat
3 Elevate affected part slightly and allow to warm gradually

F ostbit is i j y of the supe f i l ti ues d to f zing t m y be divid d int three grad of seve ity

1st d gr e Fr zi g without bli t ing or peeli g
2nd degree F ezing with blistering o peeling
3rd d gree Fr zing with death f kin nd/o d pe ti

In mild ca es th e i numbne p i kli g and it hing W th inc easing ve ity the may be p r the ias and stiffne Du ing thawing, t nd ness and b rning pain a e pr nt Th kin i whit yellow in l and the l stif.n ss nd imm b l ty Edema blist rs n crosis and g gr ne may ppea

T atm nt

The ha ot be suf i t li i l xperi c t on lus ly evalu te various tr tm t m thods sinc it i d ff lt t d t rmin th d ation and degr of exposu and to o r tly as te t a d s ve ity of i ju y when th p ti t is fir t een

A Imm d t Tre m t

1 R wa m g The m tt f w ming s ont vers l in p tient re eldom e n while in th f ozen t g Custom ha di tated dvantages to slow w rming but ent x pe iment l w rk ugg ts that m e pid thawing at t mpe at lightly bo body h at m y it ignificant de e in tissue ne osi It h be gge t d th t warming is be t mpli hed by imm g th f oz por tion of the body for a ve al minut s n w t he i d to but n w m th 108 F (42° C) Aft thawi g ha oc ur d d i w p ha et rn d to orm l tempe tu t nal be t hou d be emoved

2 Protection of the local part

a Avoid ll pos ibl tr m p ur o f iction Avo d physi l ther py in the rly t ge
b Keep affect d part un o red t oom t mpe Avoid di t ontact with bed lin ns blank and loth ing
Avoid ass p r dre ing and gr y band g

d Loc l i f tions m y be tre t d w th mild oap w or w thout anti la tive g a p phyla ti peni illin i tion r t chat y ssis he If ul r t m h occur ed st ope l arti t treatm t i sugge d

f A icoagulan The us of an oagul nt i ont o ve sial l such t e tm t i l be of ue li m be in it ted w hin one d y an thawing R pid t g bef n n a um (e p ge 2 6 for d se ge) In ile ed l m ust a ntinuous prolong t m of the ice g t on for a pe i d of about one we k Th m y be ef in p vent g eronia y t r mbos e d g e g V ulatore Th age b us at p nt be pe ic ly able

R p ive su g

1 E l d t s ge l the s y intervertac he be ing pr

2 Ru ge may be so ed when pag 2 1)

4 Treat shock when present (see page 31)

B Follow up Avoid *immediate re exposure to heat*

HEAT CRAMPS (*code No 270-445*)

Heat cramps are painful spasms of voluntary muscles of abdomen and extremities due primarily to salt depletion and following sustained exposure to heat The skin is moist and cool and muscle twitchings may be present The temperature is normal or only slightly increased Laboratory studies reveal hemoconcentration and low serum sodium

Tr tm nt

A Emergency Measures

1 Sodium chloride 1 Gm (15 gr) every 1/2 1 hour with abund nce of water or saline solution by mouth or 1000 cc (1 qt) physiological saline I V This usually relieves attack promptly

2 Have patient rest in a cool shady place

3 *Massage sore muscles gently*

B Follow up Rest for 1 3 days depending on severity

BURNS

Burns are tissue injuries due to heat and may be graded as follows

1st degree Erythema without blistering (code No 13 4411)

2nd degree Erythema with blistering (code No 13 4412)

3rd degree Destruction of deeper tissues (code No 13 4413)

When tissues are burned plasma is lost into the burned area and from the surface of the burn This leads to hypoproteinemia which remains as long as a granulating surface is present and the granulating surface heals poorly as long as there is hypoproteinemia The loss of plasma results in a redu ed blood volume hemoconcentration low cardiac output decreased blood flow oliguria elevated N P N and leukocytosis Though anemia may occur at the time of the burn d e to r b c destruction it more commonly becomes apparent about the fifth d y as hemodilution begins and as the effects of blood destruction and impaired r b c formation make themselves apparent Secondary infection is prone to occur and must be treated promptly Death may result in an adult when 30% or more of the body surface is involved In an infant 10% may be associated with very severe effects

The co rse of a severe burn may be divided as follows

1 Immediate shock (neurogenic)
2 Burn shock (first 48 hours)
3 Toxemia (occurring about 3rd day)
4 *Sepsis (about 3rd day)*
5 Healing and restoration of function

Treatment

Take blood pressure pulse hemoglobin RBC hemato rit and plasma proteins at start of therapy and at regular intervals

A. Em rgency M ure (See p g 31 f r tre tment of shock.)

1. Fl n t a fu ons at on. A rough timate of plasm ne ds m y be determined by one of the following f rmulae. Administ 100 c of plasma
   - a. For each 1% incr as in h matocrit above 40%
   - or b. For e h 100,000 increa e in RBC abo e 5 million
   - or c. For e h 2% incr ase in Hgb above 100%

   H man rum albumin in app opriate dosage may be sub stit ted for plasma whe a ailable; this decr ases pos ibility f transmitting hep titis (see p ge 29).
2. Blood t ansfusion if blood loss has oc urred.

B. S rgi al M a r s

1. Cl an ing and d b idem t (As ptic t chnic throughout.)
   - An theti e p ti nt if n cess y.
   - b. Cl anse burn and surroundi g are gently with soap and t ril salin. Do not rub vigo ously. Ether or benz ne m y be u ed to remo g ease or oil. Rem ve loose and ne rotic tissue. If neces ry to open blisters do so as ptically.
   - d. Do not a p y tannic acid, silver itrate, or m l nunt or po ders to burned area.
2. P ssu e dr s ing (Maintain strict as psis.)
   - a. Cov r p rt with st rile petr l tum or simila g uze st ips.
   - b. Apply g uz pads and fluff d sponge.
   - c. Bandage s gly with roll bandage.
   - d. Cover with cotton spong s c t ril m hinists wa t.
   - e. Apply pr sure with m in, stockinette, or lastic bandages.
   - f. R move ft r 10-14 days. P epare for skin gr fts.

C. Ge l Me r

1. Tr at ill l M if inf ction is suspe t d (see page 503).
2. Antit ins for t tanus and g gangrene as needed (se pag 470).
3. Fluids to maint in rin ry output at 1,00-1500 cc d y.
4. Sodium h. t 4 8 12 Gm (2 3 dr) d ly.
5. Pl sma or blood as nee ded; hypoprot inemia m y oc u .
6. High c loric (3500 Cal.) diet with dded itamins (e page 56).
7. The plac of orti otropin (ACTH) and cort one in the man ag m t of burns i not l e. Their eff cts in th acut bu ns d not ppear to be as dr matic as origin lly r ported. They m y have g at r va ue du ing the pha of hea ing.

ELECTRIC SHOCK (code No. 010-457)

Dir t current i much l e dang rous than alt rna ing current. Alt rnati ng c rr nt of high frequency or high vo ge is le s danger ous t an of low f que y or l w vo age. W h a terna i g curre of 25 to 300 cycl s, l w volt ges (below 2 0) tend to produce ven tr u a fibri ation, high v ltages (ove 1000) r spi atory f ur, int rmedi t voltages (2 0-1000) both. There is burns at one y . . . . . . or without an . . . inflamm tory . . . on. Little happens t them

for several weeks sloughing then occurs slowly and in a fairly wide area Electric shock may produce loss of consciousness which may be momentary or prolonged With recovery there may be muscular pain fatigue headache and nervous irritability The physical signs vary according to the action of the current With ventricular fibrillation no heart sounds or pulse can be found and patient is unconscious The respirations continue for a few minutes becoming exaggerated as asphyxia occurs and then ceasing as death intervenes With respiratory failure respirations are absent and the patient is unconscious the pulse can be felt but there is a marked fall in blood pressure and the skin is cold and cyanotic

Treatment

A Emergency Measures

1 Free from curre t at once This may be done in many ways but rescuer must protect himself in the process Throw the proper switch sever the wire with a wooden handled axe make proper ground to divert current or drag victim away by means of dry clothing or leather belt as indicated
2 Artificial respiration must be started immediately (see page 151) if victim has slow or absent b eathing and continued until spontaneous breathing returns or rigor mortis sets in
3 Precordial comp ression for ventricular fibrillation or arrest Artificial respiration will not restore its normal beat and other measures may not either
4 Treat shock promptly (see pag 31)
5 Positive pressure oxygen with carbon dioxide may be used when available or oxygen and carbon dioxide by mask com bined with artificial respiration

B Hospital Measures

1 Hospitalize patient *when revived* and observe for sudden cardiac dilatation or secondary hemorrhage
2 Lumbar puncture if signs of increased pressure are noted
3 Treat burns conservativ ly The direction and ext nt of tissue injury may not be apparent for weeks Infection is usually not a problem early Patience and delay are impor tant in treatment allow granulation tissue to be well estab lish d before attempting any surgery Hemorrhage may occur late and may be severe

IRRADIATION SICKNESS

Irradiation sickness is the term applied to the syndrome devel oping during or after the course of therapeutic x ray admini tration or after exposure to ionizing radiation (e g x rays n utrons gamma rays alpha or beta particl s)

Irradiation Sickness Associated with Irradiation Th apy

Anorexi naus a vomiting w akn ss exhaustio lassitude and in some cases prostration may occur singly or in combination and may be of varying severity Th symptom complex is most likely to occur when x ray therapy is gi en o er the upper abdomen less often over lower abdomen or thorax and rarely over the ex tremities

Tr tm t

A pe fl M

1 Pyridoxine 50 100 mg (3/4 1½ gr) I V once or twice daily may be given b t the re lts are usually di ppointing
2 S dation S e pag 35
3 D amamine® 100 mg (1½ gr) 20 60 minutes bef e ther apy r peat d 1 1½ nd 4½ hours aft r the py

B Gene l M

1 Ge e al suppo tive m as s When pati nt a e debilit t d ymptomatic m r e may be f great valu
2 El ct olyte or fl id b lan
3 T a fus with whol blood if anemia is p e nt Co r ct any d fi iencies

P oph l x

b b under T tm t

I di t on S kne C d b N l R d tion (Atom Bomb)

The sym pt m d g l t on h p ie w th doe levels A f a s known, th e e o pe m n rt si fus in mill e if ove y oc

T tm t

Th known specif t atme t Gene al s rt e me res w th ompl t bed re t d quat n t ition of arti b otl when indi ted and blood t f ion wh n ytope ia oc u all that an be off d t r t

P ph l

The hust tons d t dang of an atomi plosion i the the m l bu n Th an be minimi ed mewhat b f L g t t g ound, g the spos d part of the body or a hing shel behind bu lling wa l t tc f the 10 se onds imm t ly aft r t e oomb p osion Th following me e d or d by the tom Ene gy Commi on to mini mi poss t d x i an

A Cl the will pr vent a s f much f the m e i l t the skin
A y out m n d lothe hould be d posed of s soon as pos ib and b f re te i g a hom un min t d a
B Cl an A l F pos d Skin
1 Vig ous rubbi g w h s ap and w t or p f ab y ye (hot) de rge ts payi g p rt cul att ntion t the h skin fol and e about b
f r degree of de nt min on is achieve
c nat ion n ts fail will achieve
2 If soap and w at hed ef tive is not
or a m of be m a f 5e and
5 ml sm h bon solution t % w l be
f w more m nt are recommended, pe ial y
is as me grea e ar kin w th y be
tow and g as le w et

Chapter 22

DISEASES DUE TO TOXINS

PRINCIPLES OF TREATMENT OF ACUTE POISONING

In the emergency treatment of any poisoning in which the toxin has been taken by mouth the following general procedures should be carried out

A Remove poison by emesis lavage catharsis or diuresis as soon as possible

B Inactivate poison with specific or general antidote Follow with lavage

C Combat shock collapse and specific manifestations as they arise

D Protect mucous membranes with demulcents

R moval of Poison,

Do not use stomach tubes or emetics in poisonings due to strong acids or alkalis or other corrosive agents they may cause gastric perforation

A Emesis. This is the quickest way to evacuate gastric contents

1 Indications

a For removal of excess poison in cooperative patients

b Convenience When stomach tube is unavailable or patient is unable to take stomach tube

2 Contraindications

a For drowsy or unconscious patients Danger of aspira tion of stomach contents

b For patients who have swallowed corrosive poisons

3 Technic

a I troduction of finger feather or other object into throat

b Drug or chemical Give one of the following and follow with copious quantities of warm water E nesis should *be continued until gastric contents are cl ar*

(1) Apomorphine hydrochloride 6 mg (1/10 gr) subcut will often quiet the patient and will usually induce vomiting

(2) Mustard powdered 1 3 tsp in a glass of lukewarm water is an uncertain and unpleasant emetic but is often useful and has the advantage of being generally available

(3) Sodium chloride 1 Tbsp in a glass of lukewarm water is not very efficient but is readily available

(4) Strong soapsuds 250 500 cc (1/2 1 pt)

B Gast ic A pi ation and Laveg

1 Indi t on
   a R moval of e c of noncorrosive poisons which m y lat r be abso bed from the gastrointe tinal tract
   b R mo al of C N S depres nt poisons when vomiting does not occur (vomiti g ce ter pa alysed)
   c For c llection and xamination of g stric ont nts for identifi tion of poison
   d For conve ient administr tion of antidotes
2 Contraindications
   a Ext nsive corrosion of tis ues by poison
   b Struggling delirious stuporous or omatose patient be aus of da g r of aspi tion pne monia
3 Te hnic Gently ins rt a lubric t d, soft but non collapsibl stom ch tube through the mouth or nos into the stoma h, taking extreme are not to in rt the tube into the trache Lavag copiou ly but do not dist nd the stomach Under som conditions it is bett r to lavage with a small qua tity of fl id t freque t int rvals *Always remove excess o lavage o ution*

   Collect nd save w hi gs in clean containe s for toxi o-logi xamination when indi ted. In forensic as s thes spe im s m y be led with sealing wax and pl ed in a lock d refriger tor In such instance deliver to t icolo-gist pe onally and g t a signed r ceipt f r the specim n If r friger tion i king, preserve the specimen with equal quantitie of 95% l ohol do not us form lin, as this int r f es with t xi ologi e mination
4 Ga tric la g fl l
   a Warm t p w t r or 1% saline s l tion
   b Thin ta h past eolable
   c Sodium bi rbon t 1% s lution
   d Potassium pe mangana 1 2000 sol tion (1 0 Gm (15 g) in 2000 (2 qt) water)
   e Sod um thios lf te 1% solution
   f Hyd ogen peroxide 1 or 2% solution

C C t Usually inef ctive

N utr li ion (Inactivation) of Poi on Prior to Ins tio l Absorpti n

E pt in ase of t ong s or a w f low g tric lavage

A Neu l tion of A id nd Alk l Se spe ific poi ons
B [illegible] Se pecif c poi ons
C Inac [illegible] Demul ent p tpit te metals

[illegible] These b and [illegible] are also othing t infl med mucous m mbranes [illegible] w egg white [illegible] in 100 cc (1 pt) [illegible] or this flou or starch solution [illegible] be sed, if possible)

Support e and Symptom i M nage

The [illegible] poisoning must be k pt unde close [illegible] observation in orde t anticipa the immediat and de ayed com p i ations of the poisoning [illegible] patients m y need spec l sur vei ance and should be placed unde the care of a psych [illegible]

COMMONLY EMPLOYED AGRICULTURAL POISONS AND TREATMENT OF POISONING BY THESE AGENTS

Chemical Type	Examples	Treatment
Metals	Arsenicals Calcium arsenate lead arsenate copper acetoarsenite (Paris green).	BAL® therapy (See page 536)
	Lead salts Lead arsenate	Calcium E D T A (See page 542) DO NOT USE BAL®
	Copper salts Copper sulfate (blue vitriol as used in Bordeaux mixture)	Symptomatic and supportive Sodium thiosulfate may be of value
Fluorides	Sodium fluosilicat sodium fluoroacetate (1080®) sodium fluoride.	(See page 540)
Halogenated hydrocarbons	Dichloro diphe yl trichloro ethane (DDT) chlorinated camphene (Toxophene) dichlorophenoxy acetic acid (2 4 D) benzene hexachloride ethylene dibromide methyl bromide chlordan methoxychlor	Symptomatic and supportive Barbiturates may be of value in controlling symptoms of C N S excitation (See page 533.)
Thiocyanat s	Lethan s, thanite	Symptomatic and supportive
Organic phosphate esters	He oethylt traphosphate (HETP) tetraethylpyrophosphate (TEPP) paranitrophenyldiethylthio phosphate (Parathione) diisopropylfluorophosphate (DFP)	Parenteral administration of large doses of atropine sulfate and magnesium sulfate appears to relieve the marked neuro muscular toxicity Give oxygen by posi tive pr ssure if pulmonary involvement develops (See page 148)
Cyanides	Hydrocyani acid gas (yanogen and cyanog n gas) nd cyanide salts	(See p ge 540 *Rapidly fatal Treat promptly*
Thiour a cpd	Alphanaphthylth our a (ANTU)	Symptom tic and s pp rti
Plant deri atives	Nicotine (tobacco or Bla k Leaf 40®)	Maintain ad quate spir tion us ng artificial re piration and oxygen if e ry
	Rot none and pyrethrum	Symptomatic and supportive

A <u>Ci 1 tory F ilur</u>

1 Shock (e pag 32) Prin ipal m ure includ recumbent position warmth administ ation of timul nts and paren t l fluid to incr as e t e blood vol me

2 Cardia f ilure (p g 182) Princip l m asures includ xyg n digit li me u ial d ti s and rarely intra ardia adr n lin

3 Pulmon ry d ma Prin ipal m as r s i clude oxyg n pecially by positi p s e (pag 148) o treatm t fo d ac f ilure if it exist avoid dministr tion of pa e t al saline o other parente al fluid (xcept pl sm)

B <u>R spi atory Abnorm liti</u>

1 R p to y obst uction Corr ct by oropha yngeal irway intrat acheal int bation, or t heotomy

2 Re pi to y depre sion

Pla in ope ai

b Admini t artifi ial spi ation p r n

c R ti tor or other means of tom ti venti tion hould be mployed as oon as pos ible

d Stim lant (ana.eptic drugs) Of l only in C N S depr ant drugs

Stimula Dr.

(1) W rm st ong b a k coff or lly or r t lly

(2) W m trong t a or lly

(3) Caff ine with odi m be oat 0 5 Gm (7½ gr) about I M or I V

(4) A om ti t l its of ammoni 2 4 (½ 1 d) in t un f wat r

(5) Ephed ine ulf t 50 120 mg (3/4 2 gr) orally or s bcut

(6) N k th m de h tion (Cor mine®), 0 25 1 25 Gm (3 3 4 18 3/4 g) I V

(7) Amphet mine s lf te 8 40 mg (⅛ 2/3 g) or I V

(8) M thamphet mine hyd och o id 2 5 15 mg (1_4 ¼ g) o ally o I V

For use of M t s l® and pi roto in, s page 537

3 Hypost t pneumonia (see page 123) P inc pal m a lude antibioti dr gs and intrat a he l p tion p s

<u>C i N ous S em I volveme</u>

1 C N S ti ment L se the hypnotic ns l onvul ant d ugs

l profil and distr ss Instr (se

Sod um myt l 250 300 mg (3¾ 7½ gr) I M or I V

b l a dehyde

(1) Oral 8 15 (1 4 dr) in h d i with p k ial or hisky

(2) R tal 8 32 (1 8 dr) in equal quantity of vege table or mineral oil

(3) I M 5 10 into buttock

Chlor l hyd t 21%

4 C cium glu ona 10% lution 3 3 cc (1 d) v ly

M gne um s 10% olution 10 (2½ dr) I V

I V 10% s lution 10 3 (1½ 5 dr)

2 C N S depression Use stimulant (analeptic) drugs (see previous page)

D Dehydration Use oral or parenteral fluids as tolerated and indicated (see page 23)

E Pain See analgesic and narcotic drugs on pages 36 and 37

ACIDS CORROSIVE (code No 010-32)

The strong mineral acids exert primarily local corrosive effect on the skin or mucous membranes In severe burns circulatory collapse may result The M L D is 4 cc (1 dr) of concentrated acid Symptoms include severe pain in throat and upper gastro intestinal tract marked thirst bloody vomitus and difficulty in swallowing breathing and speaking There is discoloration and destruction of skin and mucous membranes in and about mouth collapse and shock

Treatm nt

1. Lime water magnesia or aluminum gel orally to neutralize acid Avoid carbonates or bicarbonates internally if pos sible since these form gas and cause distension of already weakened stomach wall
2. Avoid emetics or lavage if perforation is a possibility
3. Egg whites beaten with 500 cc (1 pt) milk or water as de mulcent
4. External burns Wash with water and sodium bicarbonate
5. Eyes Wash well with 1% sodium bicarbonate solution
6. General supportive care as indicated (see page 531)

ALCOHOL, ETHYL

Ethyl alcohol is a mucous membrane irritant and a C N S de pressant The M L D is 100 200 cc (3 7 oz) of pure alcohol when ingested at one time

Treatment

A Acute Intoxic tion (cod No 010 332)

1. Careful physical examination especially for evidences of head injury
2. Avoid sedatives or narcotics
3. Lavage stomach with lukewarm water containing 4 Gm (1 tsp) sodium bicarbonate or give apomorphine 6 mg (1/10 gr) if alcohol has recently been ingested
4. Stimulants
   a *Strong black coffee orally or rectally*
   b *Caffeine* sodium benzoate 0 2 0 5 Gm (3 7½ gr) every 4 hours subcut
   c Coramine® 1 5 cc of 25% solution I V
5. *Oxygen therapy for comatose patients* if needed Immediate cause of death is usually respiratory failure

B *Delirium Tremens (ode No 003 332)* (see page 537)

ALCOHOL, METHYL (code No 010 331)

M thyl alcohol i a mucous m mb ane irritant and C N S depress nt which has an affinity for the optic n rve It is slowly xcr t d from the body and is m tabolized givi g formaldehyde and f rmic a id a end p oducts which produce acidosi The M L D by ingestion i 30 60 cc (1 2 oz) The p ti nt experi n e h ad a he epig tric p in dyspne naus a and vomiting and m y s f f r los of ision Exami ation r ve ls hyperemia cyanosis e cit me t or dep ssion delirium coma and convulsions

Tr tment,

1 La age toma h well with 1 or 2% sodium bi rbonate
2 Che k serum CO_2
3 Sodium bic rbonat 0 5 Gm (7½ gr) orally eve y 2 to 3 hours as neces ary or 100 300 c 5% N HCO_3 I V (S page 24)
4 K ep patient in da k room and institute upportive m re as indi t d

ALKALIS (code No 010-32.)

Th trong lk lis are common ingredie ts of household l ans ing ompounds and may a ide tally be ingested They exert thei ffects on the skin and mucous membranes b t in instanc of e vere involvem t may cause circulatory f llure and ollape The M L D for th austic powders (N OH and KOH) is 15 Gm (½ oz), f r strong ammonia w t r 4 c (1 d). R overy has followed mu h l rg r dos how ver There e symptom of burning pain in uppe g tr in tinal t act na se and vomiting, and difficu ty in w llowing nd br thing Physical xamination r ls de truc tion and dema of skin and mucou memb ane ts and about mouth, bloody omit and stool dy pnea, and ir ulatory collapse

Tr tm t

1 A oid emetics and lavage if perforation is a possibility
2 Dil te ineg r or itrus j i s to neutralize alkali 120 to 240 c (4 8 oz) of 0 5% hyd ochloric acid may be us d
3 Cla fal of o ind oil (helps neutrali tion by form tion f soaps), wh tes of 4 egg well mixed wi h w ter or 1 2 Thsp gelatin in 500 cc (1 pint) of w t r
4 W t h for edema of la yn do t a heotomy if needed
5 Supportive m asure a ne s ary
6 W sh xt nal burns with dilut inegar or citrus j i
7 Wash y s with boric a id s ution or water

ARSENIC

(Acute: code No. 010 3114) (Chronic code No. 011 3114)

Arsenic is found in industrial chemic s g iculture spr ys and dusts rodent xt rminators, household ant pastes and arsen ical medication

Gen ral Reaction

Any of the following may be present severe nausea and vomit ing abdominal cramps diarrhea marked thirst choking sensation and difficulty in swallowing cyanosis marked cerebral symptoms and coma

Treatment

1 Emetic or abundant gastric lavage with warm water
2 Follow with demulcent drink
3 Symptomatic relief of diarrhea (e g codeine)
4 Dimercaprol Injection U S P (BAL®) 10% solution in oil. Give I M (Eagle J Ven Dis Inform 27 114 1946)
   a Severe poisoning 3 mg /Kg /dose (1 8 cc /60 Kg)
      1st day 1 injection every 4 hours d y and night
      2nd day 1 injection every 4 hours day and night
      3rd day 1 injection every 6 hours for 4 doses
      4th day on 1 injection b i d for 10 days or until re covery is complete
   b Mild poisoning 2 5 mg /Kg /dose (1 5 cc /60 Kg)
      1st day 1 injection every 4 hours for 4 doses
      2nd day 1 injection every 4 hours for 4 doses
      3rd day 1 injection b i d
      4th day on 1 injection once or twice a day for 10 days or until recovery is complete
   c Toxic reactions to BAL® These appear to be transient and over in 30 minutes They include nausea vomiting headache generalized aches and pains and burning sen sation abo t the head and face Barbiturates have been recommended for severe side effects

BARBITURATES (code No 010 3371)

Barbiturates are used for sedative hypnotic or anticonvulsant purposes The barbiturates are one of the most common means of both suicidal and accidental poisoning

Obtain data on dosage and time of ingestion from patient rela tives fri nds or attending physician when possible

A Mild Symptoms Drowsiness mental confusion headache there may be euphoria or irritability
B Moderate or Marked Symptom Delirium stupor shallow and slow re pirations circulatory collapse cold clammy skin cyanosis pulmonary edema dilated and non reacting pupils hyporeflexia areflexia coma and finally death

Treatment

A Mild Symptoms Symptomatic and suppo tive nursing care Stimulants should be limited to caffeine Keep patient under observation until danger has passed Place suicidal patients under psychiatric care
B Moderate or Mark d Symptoms
   1 Hospitalize
   2 Combat shock (see page 32)
   3 Record the following observations at 15 to 30 minute inter vals until danger has passed

a Tempe tu e p la respiration and blood pres re
b M nt l at tu or st te of on ciousne s
c Skin color (cyanosis or pallor)
d Lung ba s (pulmonary edema)
e R fl s (orneal, pupilla y g g p tellar)
f Sens tion (re ponse to p in)

4 Gastric lavag with 1 2000 sol tion pot ssium permang nate Be c rtain to mov all pe mangan te in final aspir tion This is of doubtful value if performed more than 6 hours aft ing stion of the d ug nd may be very dangerous CAUTION Danger of aspiration pneumonia is gre t in stuporous o comatos pati nt
5 Pu gation i of no val
6 Indw lli g athet Save all urin specimen for t xi o l gic studie
7 P ovid d q t airway A pi ate m us pu l tongue for ward and ins rt orpha yng l airway I trat acheal in t bation m y be advis bl
8 Oxyg n by pos ti p essure a d a tomatic ycling de ic (pag 150) may be v l abl
9 A tibioti d g l enicillin 300 000 to 500 000 unit I M daily to l sen d ger of pneumonia
10 P ent al fl id If pulmonary dema i abs t give 1 l te of physiologi l s li e and 1 2 lit rs of 5% de tros l V in water da ly If p monary edema i p nt do not saline s lution but give hypertoni d xt ose ution very lowly I V L i s fl id los has been e ssive d not gi e mo than 2 to 3 liters of fluid d ri g t e first 24 hours I the eve t of irculat ry c llap pla m
11 C tral nervous sy m tim l n (anal pti or onvul ant d g) Th a e not true barbitur t a tidot but a e uti d t maut in p t e t s apira i n and reflexes The u e is t be icted e pt in those who e sym tom re seve e pati t f ils t im rove or wh condition i prog ss ive They a e da g ous d g and unle e sed refu ly m y jeopa d z the pa i nt s chance for ecove y Superiori y of the v i us analeptic gent i con over si l o e re l a me tioned
a Pi rot in I n i n L S P (0 3% or 3 m g / c) Admi st r 3 3 c I V (r I M) at once a d fo low w th 3 very 20 30 minut u til r turn of r l s mall tw i h) ga se bod movement (not convu or) C w m st nam d we nece ry t keep pati nt t a level
b Pent len t trazol I (tra L S P (M (10% or 100 mg /c) (A t r Murphy t l) (we
(1) 3 c I V t once
(2) 5 cc I V in 15 min if p e t a C
(3) 20 I V eve y 20 minu s Res r e a
l) 3 5 I M p n ant l fu l crea t ance r e a d
Other p r Amphe am ne Su f e L S P
(Ben drin) Ephedri Hy ro ide L S P
Met amp et ine H y h e L S P and atry n e ne a l (h s a l been u d eve e a n e ne be m di o on, ut t a e mone of barbitur g but the has been no de e s de be)

over the above treatment methods
12 Dialysis of the patient s blood with the artificial kidney is indicated in severe cases when available

BELLADONNA DERIVATIVES
(Atropine code No 010-362) (Scopolamine code No 010 379)

The belladonna alkaloids are parasympathetic depressants with variable C N S effects M L D is 2 6 mg (1/30 1/10 gr) of atro pine sulfate but the usual lethal dose is nearer 100 mg (1 1/2 gr) The p tient complains of dryness of mouth thirst difficulty in swallowing and blurring of vision The physical signs include di lated pupils flushed skin tachycardia fever delirium delusions paralysis and stupor

Treatment.
1 Tincture of iodine 4 cc (1 dr) in 1000 cc (1 qt) of water
2 Universal Antidote charcoal in water (See back cover)
3 Lavage well with 1 2000 potassium permanganate solution
4 Magnesium sulfate 30 Gm (1 oz) in water
5 Pentobarbital sodium 0 1 Gm (1 1/2 gr) for excitement
6 Avoid opiates
7 Institute supportive measures

BROMIDES
(Acute code No 010-3217) (Chronic code No 011 3217)

Bromides are C N S depressants frequently found in medicinal preparations Acute poisoning is ra e The symptoms include anorexia constipation drowsiness apathy and hallucination The physical examination reveals dermatitis conjunctivitis foul breath furred tongue sordes unequal and irregular pupils ataxia ab normal reflexes (often bizarre) toxic psychosis delirium and coma

Treatment.
1 In acute poisoning, lavage copiously with saline to remove unabsorbed bromides and later to remove those excreted into stomach Follow with magnesium sulfate 30 Gm (1 oz) in water for cath rsis
2 Sodium chloride 6 12 Gm (90 180 gr) daily in addition to regular dietary intake 1000 cc saline I V b i d or the same rectally or 1 2 Gm (15 30 gr) every 4 hours orally
3 Force fluids to 4000 cc daily
4 Use continuous warm baths (95 96 F) or sedative cold packs as necessary
5 Otherwise treat symptomatically

CARBON MONOXIDE (code No 010 352)

This gas is responsible for many d aths and near deaths result ing from the us of unvented gas or coal burning heaters It is also fo suicidal purpo es It combines with hemoglobin to form a

rel ti ely stabl compound whi h se ond ily c us s t ssue an a Manif tati ns a h da he f intn ss giddine s tinnitus vomit ing he ry ed skin rtigo loss of memo y f inting collaps paralysi and unconscious as

Labor t y D t Wh boiled o wh n shak n with 1 to 2 v l um f od um hydroxid blood rem ins r d while no mal blood becom s black o b wn black

T tm t

1 R move pati t to f esh ir keep wa m loos n clothing and m int in at e t
2 Inhal tion of oxyg n
3 Artifi ial re pirati o re uscit tion s n eded
4 Giv 50 c of 50% gluc I V f r c bral edema
5 Institut pp rtive m sur s

CARBON TETRACHLORIDE (code No 010 33411)

Thi g t l a v y common one in ind stry and the h me be ing us d a a s lv nt and cl an ing ge t It is a loc l irrit t ard c d p ssant an irr gula C N S depres ant and gen l p otopla mic poi whi h has a mark d eff t on the liver d kidn y It ente the body by ing sti and inhalation The M L D i 4 c (1 dr) wh ing sted the M L D by inh l tio is unknown Tr ymptom in lude h da h hi o gh n us a omiting, diar rh abdominal pain d wsin ss visual disturban n ritis and intoxi tion E rly signs a t nde li r j undi ligu i and ur mi iate ephrosis d cir ho is o cu

Tr tm t

A A ut P isoning

1 R m e f m xposur ke p re umbe t and w m
2 Cal ium gl on te 10 cc (2½ d) of 10% solution I V m y peat
3 La g copiously with 1 2000 pota i m pe manganat olution
4 M gn sium sulf t 30 Gm (1 oz) in wate at on
5 Tr t as pot nti l cute h patitis (pag 279) Observ f oliguria If it be om s manif t t t as cute l f ilure (e p g 303)
6 Institut supportive therapy

B Ch oni Poi oning

1 R mo f om xpo ure
2 Caref lly evaluat he rt li r and kidney fun tion
3 High p ot in high CHO low f t diet (page 53)
4 Prot in hyd olys te and gl os in line or w t 2000 3000 (2 3 qt) I V daily Continu until f ll di t is taken
5 Cal ium gl conat 10 cc (2½ dr) of 10% l tion I V b i d and 8 12 Gm (2 3 d) by m uth d ily
6 Tr t s a pot tial cirrhosi (ee pag 280)
7 Symptom tic and supportive mea ur s
8 Avoid lcoh l

CYANIDES (code No 010 353)

Hydrocyanic acid and the cyanides cause death by inactivation of the respiratory enzyme preventing utilization of oxygen by the tissues The acid is most lethal and the M L D is 2 cc (1/2 dr) either by ingestion or inhalation There is a rapid onset of giddi ness loss of muscle power and stupor accompanied by panting respiration and by profound collapse The odor of bitter almonds is on the breath

Treatment,

Work rapidly for death occurs quickly

A If I haled
   1 Place in open air keep in recumbent position
   2 Maintain artificial respiration manually until arrival of resus itator
   3 Amyl nitrite (place perles inside mask) by inhalation for 15 30 seconds every 2 minutes
   4 Sodium nitrite 10 15 cc (2 1/2 4 dr) of 3% solution I V (or 50 cc of 1% solution) taking 2 4 minutes for injection

B If ingested lavage stomach copiously with 3% hydrogen perox ide solution 10% sodium thiosulfate solution or 0 2% potassium permanganate

C Supportive th rapy

DDT (Dichloro-diphenyl trichloro ethane) (code No 010 3)

DDT is a C N S stimulant which can cause poisoning by in gestion inhalation or direct contact The M L D is probably about 20 Gm (5 dr) but few fatalities have been report d When poisoning occurs from the material in solution the actual poisoning is usually due to the organic solvent and not DDT The manifesta tions are tir d and aching limbs nervous irritability mental slug gishness mus le twitchings convulsions and coma

Treatment

1 Univer al Antidote at once if available (se back co r)
2 Lavage with large quantities of warm water
3 Magnesium sulfate 30 Gm (1 oz) in water
4 P ntobarbital sodium 0 1 Gm (1 1/2 gr) orally
5 Calcium gluconate 10 cc (2 1/2 dr) of 10% solution I V for convulsions
6 Avoid epinephrine May cause v ntricular fibrillation
7 Supporti m asures as necess ry
8 High CHO and high protein diet with vitamin B supplements to protect liv r

FLUORIDE POISONING (code No 010 3215)

Fluo ides are found in agricultural poisons and insect powders and a e used in the aluminum industry Clinic l feat es include vomiting colicky abdominal pain d arrhea cyanosis
N S excit ment and convulsions

T atm nt

1 Lim w t r o ally in larg quantiti
2 Gi e emetic or use copious gastric l vage with lime wate
3 Egg whit b ted with 500 cc (1 pt) milk or w t r
4 Stim lant (se page 533)
5 Calcium gl onat 10 c of 10% s lution I V rep at if tetany occurs
6 A tificial r pir tion
7 Combat shock

GASOLINE AND RELATED COMPOUNDS (code No 010 33x)

G s line poisoning may esult ith r from inhal tion r ing s tion but m e sever symptom r sult from inhalation beca e th C N S i more quickly re hed by this route Th manif tations in the cute f rm e omiting v rtigo m cul r in oo dination weak and ir egula puls tw t hing and onvul ions In the hro ic fo m th e is also h dache drow in s dim vision cold and n mb hand w akn lo of memory lo s of weight ta hy ca di m tal duline s o confusion so e in mouth d m t es and s ndary an mia

Tr tm t

1 R move to f esh ai
2 Lav ge with lad oil and/o larg amounts f warm saline
3 M gnesium ulf t 30 (1 oz) in wat followed by min al il 120 c (4 oz)
4 W t h l s ly for 3 or 4 days for sev symptoms and fo collaps

IODINE POISONING (code No 010 3218)

Clini l f atures in lude ha a teristic tain of mouth and odo f b th yell w or bluish vomitu p in and b i g in ph ynx and ophagu m k d thirst diarrhea (stool m y be bl ody) we kn di zines yncope o onvulsions

Tr atm t

1 Gi ta ch, flou r w gg whit o 1% sodi m thi lf t i wat by mouth
2 F ll w with m tic or r move by lavage with 1% sodium thi sulf te lution Repeat until eviden e f iodin ha di ppeared f om g at ic ont t
3 The give dem lcents e g milk or b l y wat r
4 Symptom ti and supportive m u es for syst mic r tion g stimula t o anti onvul ants

LEAD POISONING (code No 010 3112)

Le d m y po son by ing tion inhal tion of its f m It has a local ast ing nt action and a ge ll ed t ic eff ct The M L D is 10 Gm (150 gr) f l d a tat P i oning is manif st d by

metallic taste dry throat thirst abdominal colic vomiting diarrhea constipation headache leg cramps black stools (lead sulfide) oliguria stupor convulsions palsies and coma In the chronic form there is variable involvement of the C N S blood forming organs and gastrointestinal tract

Treatment

A Acute Poisoning *Do not use BAL®*
 1 Lavage with dilute magnesium sulfate or sodium sulfate solution to precipitate insoluble lead sulfate
 2 Treat symptomatically Avoid narcotics treat colic with local heat antispasmodics and sedatives
 3 *Mono calcium disodium ethylenediamine tetra acetate* (Calcium E D T A or Calcium Disodium Versenate Solution) intravenous® This agent forms a soluble un ionizable lead complex that is excreted in the urine and has apparently been used successfully in the treatment of lead poisoning Dosage varies 300 600 cc (10 20 oz) 5% solution over a 2 hour period I V daily for 5 10 days

B Chronic Poisoning
 1 Remove permanently from exposure
 2 *Adequate diet with vitamin supplements*
 3 Courses of Calcium E D T A may be employed especially when hematological complications have occurred to rid the body of lead (see above)

MERCURY (code No 010 3111)

Mercury poisoning occurs by ingestion or inhalation It is a *general protoplasmic poison The M L D is about 70 mg (1+ gr)* of mercury bichloride The manifestations include metallic taste salivation thirst burning sensation in throat discoloration and edema of oral tissues abdominal pain vomiting bloody diarrhea and shock In the chronic form there is weakness ataxia intention tremor irritability depression and muscle cramps

Treatment

1 Give white of eggs beaten with water or skimmed milk
2 BAL® *must be started at once (see page 536)*
3 Magnesium sulfate 30 Gm (1 oz) in water
4 Fluids 1000 cc (1 qt) of saline I V at once (may add 1 Gm sodium thiosulfate) and repeat as necessary
5 Watch urinary output Treat oliguria and anuria if it occurs (see page 303)
6 Symptomatic and supportive measures as necessary
7 In chronic form remove from exposure may give 1 0 Gm (15 gr) of sodium thiosulfate in 10 cc (2½ dr) water I V every other day

MORPHINE (AND THE OPIATES) (code No 010 370)

Morphine acts primarily on the C N S c u ing d pr ssion and The M L D is 65 mg (1 gr) in su eptible individuals

M nife tations incl de he da h n us ex item nt d p e si n pin point p pil slow respirations r pid nd f ebl puls ho k and oma

T tm t

1. N lorphin Hyd ochlorid N N R (N lline®) a narcoti tagonist in dos s of 5 10 mg I V as antidote for ov dosag of m phin and its d riv tive m peridine (Deme ol®) and m thadon If eff cti in eas in pulmo n ry ve t lation is not achi ved with the initial dos 5 10 mg m y b epe t d in 10 to 15 minut s and again d pending upon th degr and d at n f na oti dep essi n
2. M intain adequat re pirat on by u of artifi ial re piration pref bly sus tat s with o yge
3. Ke p p tient awak and w rm have him w lk if nec ssa y or use mmo ia inhalat on a d t ong stimuli
4. Antidot of 4 c (1 dr) tin tur of iodin in quart of wate if taken ally
5. L vag tomach well with 1 2000 potassium permanganat at short interval M rphin is e eted into the stom ch
6. Magn ium If te 30 Gm (1 o) in w te as catha ti
7. Atropi sulfat 0 5 mg (1/120 gr) subc t if re pirati s a e poo pe t as ne sary

MUSHROOMS (code No 010 384)

P i oning du to th Amanita ph lloid and th Amanit mus caria i manife t d by se coli thir t naus and vomiting p of diar h a, w akne collap heavy bre thing slow p l e con t i t d pupil onfu ion excit m nt oliguri and coma

T tm t.

1. Atropin s lfat 0 5 1 0 mg (1/120 1/60 gr) ubcut at once and pe t as needed. (Antidot fo mu rini a tion)
2. Uni e al Antidot whit of ggs in milk or 1 tsp tin tur of iodin in a quart of w ter
3. Lavag with 1 2000 potas ium pe manga at olutio
4. Magne ium ulf t 30 Gm (1 oz) in w ter a c thartic
5. P tobarbital odium, 0 2 Gm (3 gr) orally fo e item t
6. Bismuth s b bo ate 1 0 Gm (15 gr) ev y 2 hours fo g t itis
7. High s line e m to help pre t ab orption
8. Fo fluids by mouth and par nt al routes
9. Institut supportive meas Wat h fo hepa

OXALIC ACID (code No 010

Oxalic acid a component of bl achi local ir itant whi h p cipitat s ionized 4 Gm (1 dr) Poisoning is manife ted b throat viol t abdominal pain bloody vo, oliguria, and circulatory c llap

SNAKE (AND GILA MONSTER) BITES (code No 010 3814)

The venom of poisonous snakes and lizards may be neurotoxic or hemotoxic Neurotoxin causes respiratory paralysis hemotoxin causes hemolysis and destruction of endothelial lining of blood vessels The manifestations of poisoning are local pain thirst profuse perspiration nausea vomiting stimulation followed by depression local redness swelling, extravasation of blood and collapse

Treatm nt,

1. Keep patient recumbent and quiet
2. Apply tourniquet above bite releasing for 1 2 minutes every 15 or 20 minutes
3. Cut deep cross incisions at site and apply suction
4. Give specific antivenom (Follow printed instructions)
5. Plenty of warm fluids no alcohol (synergistic with venom)
6. Barbiturates if sedation is needed Avoid opiates
7. Institute supportive measures transfusions if necessary

SPIDER BITES (code No 010 3815) AND SCORPION STINGS (code No 010 3815) (Black Widow Spider Bite code No 010-3816)

The toxin of the less venomous species of spiders and scorpions causes only local pain redness and swelling That of the more venomous species causes generalized muscular pains convulsions nausea vomiting variable C N S involvement and collapse

Tre tment

1. Apply tourniquet cut cross incisions and apply suction
2. If absorption has occurred give 10 cc of 10% calcium gluconate I V or I M Repeat as necessary
3. Give specific antivenom (Follow printed instructions)
4. Keep patient recumbent and quiet
5. Hot baths and 20 cc of 10% magnesium sulfate I V for relief of pain (see caution on page 296)
6. Adequate s dation Institute supportive measures
7. Hot compresses of sodium bicarbonate solution for relief of local pain if no systemic involvement
8. ACTH or adrenal steroids may be of some value (see page 423)

Mo
narcosis

r

APPENDIX

MEDICAL REHABILITATION

By reh bilit tion med l rehab litation o rehabil tation of the physic lly handi pped patient s meant th st tion of the p tie t to his maximum phy i al s ial and con mic cap c ty It diff s f om d finiti m d cal th rapy th aim of whi h is to cure iline and to p olong lif

R habilit tion has also b n call d the third pha e of m dical care The three phas s are (1) pre ention of illness (2) d finitiv medical car and (3) rehabil tat on

R h bilit tion d not and hould not be del y d until d finitive m di al are has been completed to be mo t ff ctive t should st rt at th o s t of any illness a ute or hroni Frequ tly d finitiv therapy and rehabil t tion ar diff ult to reconcile ppro p iate compromises must be m d in ord to rend r he t servi e to the p t nt

Many a residual dis bility is not caused by the or ginal illn ss but by inactivity (g b d re t o hair r st) or tivity i faulty p ition b au of w kn ss or p in Fl xion cont ture de cubit s ulc s p inful houlde s in hemiplegi and my ardi l in far tion e ali v idable if rehabil tation is sta t d early Furth r m e the psy hologi l outlook fo th patient (and thus his o ope ation with therapy) imp oves when he knows the goal is not only c at on of iline s but re t tion to u fuln s a w ll

REHABILITATION OF THE HEMIPLEGIC PATIENT

Advan es in physi l m dicin have given new hop to the p t t wh uffer f om h m pl gia a ondition whi h i n ounte d m e and mor in lin l medicin Th f llowing program i in t nded t erv only a guid it appli s t the typi al as of c eb al vas ula a id nt but the principl s are th sam in h mipl gia of any tiology

B d Phas

St t on s ond or third d y of iline or as oon s the p ti nt i consciou Th p ti nt bed should be of hair h ight and hould have id alls and an ove he d trapeze

- A E ci Start with ten minutes of cise ry two hours and inc e to 30 minutes of xe i very two hour
  1. With good arm and leg, turn f m b ck to id to abdom n, the to othe ide and then ba k Repeat in opposit direction
  2. With good hand on trapeze pull to sitting position and back
  3. Move sidew ys upw d and downw ds in bed
  4. Sit up on edg of bed with ide rail moved, l gs dangling and move along dg f bed with id of good a m and leg
- B Self Ca e (ll done with good hand)
  1. Toilet activiti Wa h f and hands comb hair shave
  2. Feeding acti itie At first in bed with b k rolled up later sitting on dg of bed
- C B a ing None during bed phas

Standing Phase

Starts three to five days after beginning bed phase and should replace bed phase as soon as possible Patient is placed in an arm chair with his good side next to the bed the vertical bar of the over head frame in reach of his good hand and the paralyzed arm in a sling

A Exercise Start with ten minutes of exercise every two hours and in rease to 30 minutes every two hours
 1 With good arm pull to standing position on good leg Sit back
 2 Standing with good hand on vertical bar of overhead frame perform slight knee bend and straighten up R peat with gradually deeper knee bends
 3 Stand with good hand on vertical bar of bed frame Go up on toes come back down

B *Self Care (using good hand)*
 1 Toil t activities Complete bath in bed
 2 Dressing activities Dress and undress except for shoes

C Bracing
 1 Flat wooden splint (attached to volar surface with ace bandage or straps) from one inch below the elbow to one half inch be yond the fingertips of the paralyzed arm
 2 Keep paralyzed arm in sling to prevent pull on shoulder
 3 If after two weeks the paralyzed leg still swings completely flail at the knee joint a long leg brace is needed in order to continue rehabilitation

Stair climbing Phase

Sta ts two to ten days after the beginning of the standing phase *and sho ld replace standing phase as soon as possible*

A Exercises Performed four times a day increasing from several steps to a whole flight of stairs The patient is placed in a chair facing the foot of a flight of stairs the good arm next to the banister The paralyzed arm is splinted and in a sling and the paralyzed leg is in a long leg brace if needed
 1 Pull to standing position holding to the ba ister with the good hand step up one step with the good leg then pull para lyzed leg up to the same st p Continue for several steps
 2 Step backward and down with the p ralyzed leg and put th good leg down next to it Continue for several steps
 3 While several stai s up turn towards and reach over to the opposite baniste Step forward and down with the paralyzed leg Then place good leg next to paralyzed leg and continue

B Self Care *Complete toilet and feeding and dres ing activities* should be possibl by this time

C Bracing
 1 Long leg brace if indicated
 2 If patient has a foot drop during stair climbing he should *have a short leg brace with a 90° posterior stop at ankle*
 3 If the patient shows evidence of inversion or eversion of the foot he should have a short leg brace with a T strap
 4 If function has returned to the paralyzed hand the splint may b discarded Oth rwise it should be worn int rmittently

Ca walking Pha e

Start a oon as the pati nt is cap ble of walking up and down a

whol flight of stai s with ut t: ing and ane is held with good h d Par lyzed arm is k pt in sling a e re mmended fo the hemipleg p t t Two differ nt g it u ing a can

A Sl w G it (For fea ful patients or p ti nt w th poo balan)
Mo e ane forward pl ce good f ot next to can and then d ag pa alyzed foot n xt t good foot

B F st G it
1 Stand g on g od l g plac ane and p ralyzed leg fo ward simultaneously and put w ght on them
2 Swing good leg thro gh in f ont of cane nd p alyz d l g and p t weight on it Continu in this fashion

ecial P oblem in H mipl g P ti t
1 C f th P r lyz d Uppe E t m ty
1 C mpl t bsen e f f ct n In most ses no useful func tion t ns to th paralyzed upper extr m ty and th w ist and hand e be t upported in the splint The sling m y be d s rd d l ter wh n th hould r mus l s be om pasti and the pati t f l limited by th sling With hi good h nd th p ti nt should mo e the par lyzed fing wrist and lbow through th full ang of m tion tw e a day In ord to mo e the paralyz d sh uld through th f ll ange of m tion th p ti t m y n d a c d th ough an ove h d pul ley by means of which the p alyzed rm (tied t the w ist) ca b pull d up as high a pos ible with th good a m
2 Partial fun ti n If only p rtial f nction r tur s to the para lyzed ext mity th p ti nt should us t only to th xt nt to whi h it i h lpf l o expedient For th a tivities the patie t should b t ain d in the use of th good xt mity
3 Complete fun ti n If c mplete function etur s the p t ent should se the xtr mity as m h as pos ible

B T atm nt f Apha ia If pha ia oc u e p h ther py (daily in h lf hou per ods) sho ld be started as soon as po sible If a n ory o r c pti e aphasi i p e ent th bove p og am may be dered xt emely difficult since it is b ed on th ability of th p tient to und tand what is eq ired of him

C C e f H mian p ia (a min p obl m) If h mianop ia is p th p t t h uld be t ain d t t n his h d to the h mianop ic sid in rde to bring his vi ual fi ld in f ont of him Later e m adjustm t in th vis al fi ld occu

D C of Sphin t r Som hemipl gics e incontin nt f th ly pha An indwelling th t r i rarely nece ary Th p ti nt sh ld be r mind d to mpty his bladd r oluntarily at hou ly int rv ls Th e int rvals an be g adually i cre ed

E Orga i M nt l Synd ome Wh n this i p nt the wh l e hab l t t on p og am b om difficult Th pati nt m y ith not unde tand o may be unabl to once t ate Th onf sion m y b pr nt at one tim and abs t t anothe and dvantage hould be t k f the pati nt s l cid p iod Org nic m tal synd om oc u s us lly in p ti t wh ha had ver l t ok s The pati nt s m ntal tate us lly imp ov onside bly du ing an a tive r habilit tion p ogram

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NORMAL HEMATOLOGICAL VALUES

White Blood C lls 5 000 10 000 per cu mm

Myelocytes	0 %	Lymphocytes	20 40%
Juvenile Neutrophils	0 %	Eosinophils	1 3 %
Band Neutrophils	0 5 %	Basophils	0 1 %
Segmented Neutrophils	40 60%	Monocytes	4 8 %

Platelets *200 000 to 500 000* per cu mm

Red Blood Cells in million per cu mm
Men 5 0 (4 5 to 6 0) Women 4 5 (4 3 to 5 5)
R ticulocytes Less than 1%

Hemoglobin in Gm /100 cc
Men 15 16 Gm (13 5 18) Women 13 15 (12 5 16 5)

Hematocr t (packed cell volume)
Men 45 47% (38 54%) Women 40 42% (36 47%)

Cellular Measurem nts of r b c Average d am 7 3 μ (5 5 8 8 μ)
Mean Corpuscular Volume 87 c μ (80 94 c μ)
Mean Corpus ular Hb 30 γγ (28 3 γγ)
Mean Corpuscular Hb Conc 35% (33 38%)
Color Saturation and Volume Indices each 1 0 (0 9 1 1)

Bleeding Time Duk 1 4 minutes Ivy less than 4 minutes
Coagulat on Time Lee and Whit 5 15 minut s

NORMAL BLOOD CHEMISTRY VALUES

	Constitue t	Value/100 cc	mEq /Liter
Serum or Plasma	Sodium	310 340 mg	136 145
	Chlo ide (a Cl)	*350 375 mg*	*100 106*
	Total Chlorides (as NaCl)	580 6 0 mg	100 106
	Pota siur	14 20 mg	3 5 5 0
	Pho pho us	3 4 5 mg	0 9 1 5 (mM)
	M gne ium	1 3 mg	1 2
	Calcium total	9 11 mg	4 5 5 5
	CO_2 Combining Power	55 75 Vol %	24 28
	Cholest rol	150 240 mg	
	Chol ste ol est rs	65% of the total Cholesterol	
	Amylas	80 180 Units	
	Phosphata e lkal ne	2 0 4 5 Un ts (Bodan ky)	
	Phosphatase acid	0*5 2 Units (Bod nsky)	
	P ote n B nd Iodin	4 8 mi rogr ms	
	S rum Album n	4 5 5 5 Gm	Total 6 0 8 0 Gm per 100 cc
	Serum Glob lin	1 5 3 0 Gm	
	Fibrinog n (pl sma)	0 2 0 6 Gm	
Blood	Gluco 60 100 mg (tru)	80 120 mg (Folin Wu)	
	Total Non protein Nitrogen	15 35	
	U ea N trog n	10 20	
	Uric Ac d	3 6	
	C eatini	1 2	

NORMAL RENAL FUNCTION AND URINE VALUES

Phenol Red T st (P S P) 15 minutes over 25% 2 hou s ov r 55%
Ure Cl a anc 75 120% of A N F o 40 100 /minute
Addis Urine Sed ment Count (Val es for 12 hour p riod)
pH acid Sp Gr 1 025 1 030 Albumin 0 30 mg
b c 0 1 000 000 Ca ts hy line 0 100 000
w b c and mall epithelial c lls 0 2 000 000

ABBREVIATIONS USED IN THIS HANDBOOK

Abbreviation	Meaning
ā	Of e h
a	B fore m ls
ad lib	At ple su
amp	Amp l *
b i d	Twice a d y
b m	Bow l mo em nt
B M R	Bas l m t bolic te
B P	Br tish Pharmacopoei
B U N	Blood ur a nit g
c	C p
C l	C lorie
ps	C psule
C B C	Complet blood count RBC WBC Diff Hgb
cc	C bic ce tim t
cf	Conf
CHO	Ca bohyd t
C I	Col inde
m	Centimete
C N S	C tral nervou syst m
C S F	C b ospinal fluid
u	Cubic
μ	Cubi mic on
dr o	D am
E g EKC	El t oca diogram
GB	G llbladd
GI	G st oint stinal
Gm	Gram
gr	G ain
gt	Drop (gtt d op)
H	H
Hgb	H moglobin
h s	At bedtim
I M	Int am c la ly
I U	Int rn tion l unit
I V	Int no ly
Kg	Kilogram
L	Lit r
lb	Pou d
liq	Liq id
mc	Millicurie
M C H	M an corpus lar h moglobin
M C H C	M an co pu cul h moglobin once t ation
M C V	M an rpuscular volum
mEq	Milli q ival t
mg	Milligram
♏	Minim*
mm	M llim t r
M L D	Minim m l th l dos
γ	M crog am
γγ	Mi o microgram*
μ	Mi ron
N C A	Not Coun l Accepted
N N R	N w and No off c al R medi s
N P N	Nonp t i nit ogen
N R C	Nation l Resear h Coun il
oz or	Oun
P A	Perni io s an mia
p c	After m als
ppt	P e pit t d
p n	A s y
P S P	Ph ols lph phthal in ph l d
Ps	Physi l gi al l e l tion
pt or O	P nt
q	E ery
q i d	F r times d y
q s ad	S ff ie t t m ke up to
qt	Qu t
r b c	Red blood corp l
RBC	R d blood cou t
℞	P ript on
c	S ond
S I	S t tion inde
S g	Let it be label d
Sol	s lut on
p gr	pe ific gravity
	On half
St t	Imm di tely
s b ut	Subcutan ou ly
tab	Tablet
Tb p	Tabl poon
t i d	Thr tim s a day
t p	T a poon
U	U it
U S P	U S Pharmacopei
V I	Vol m i d
w b	Whit blood c ll
WBC	Whit blood ount
Wt	W ight
>	Gr t r than
<	Le tha

Abb eviations for either singular o pl al

TABLES OF APPROXIMATE EQUIVALENTS

Weight Equival nts		Volum Equivalents		
Apothecary	**Metric**	**Apoth cary**		**Metric**
1/3 0 gr	0 2 mg	1 min	(♏)	0 06 cc
1/210 gr	0 3 mg	3 min	(♏)	0 18 cc
1/160 gr	0 4 mg	5 min	( )	0 3 cc
1/1 0 gr	0 5 mg	8 m n	(♏)	0 5 c
1/100 gr	0 6 mg	10 min	( )	0 6 cc
1/60 gr	1 0 mg	12 min	(♏)	0 75 cc
1/30 gr	2 0 mg	15 min	( )	0 9 cc
1/16 gr	4 0 mg	16 min	(♏)	1 0 cc
1/12 gr	5 4 mg	20 min	(♏)	1 2 cc
1/10 gr	6 5 mg	30 min	( )	1 8 c
1/8 gr	8 0 mg	50 min	(♏)	3 0 cc
1/6 gr	11 0 mg	1 fl dr	( )	3 7 cc
1/4 gr	16 0 mg	65 min	( )	4 0 cc
1/3 gr	22 0 mg	80 min	(♏)	5 0 cc
3/8 gr	24 0 mg	2 fl dr	( )	7 5 cc
1/2 gr	3 0 mg	2 2/3 fl dr	(ʒ)	10 0 c
3/4 gr	50 0 mg	4 fl dr	(ʒ)	15 0 cc
1 gr	65 0 mg	5 1/2 fl dr	(ʒ)	20 0 cc
1 1/2 gr	0 1 Gm	8 fl dr	( )	1 0 fl o
2 gr	0 13 Gm	1 fl oz	(ʒ)	30 0 cc
3 gr	0 2 Gm	1 2/3 fl oz	( )	50 0 cc
5 gr	0 32 Gm	2 fl oz	(℥)	60 0 cc
7 1/2 gr	0 5 Gm	3 3/8 fl oz	(℥)	100 0 cc
10 gr	0 65 Gm	4 fl oz	( )	1 0 0 cc
15 gr	1 0 Gm	8 fl oz	(℥)	240 0 cc
1 dr (ʒ)	4 0 Gm	16 fl oz	( )	480 0 cc
1 oz (℥)	30 0 Gm	1 pt		480 0 cc

H usehold M a ures	Apothecary	M tri
1 teaspoon	1 fl dr (ʒ)	4 cc
1 tablespoon	1/2 fl oz (ʒ)	15 cc
1 teacup	4 fl oz (ʒ)	120 cc
1 glass (tumbler)	8 fl oz (℥)	240 cc
1 measuring cup	8 fl oz (℥)	240 cc
1 pint	16 fl oz (ʒ)	480 cc

CENTIGRADE TO FAHRENHEIT TEMPERATURES

C	F	C	F	C	F
35	95	37 5	99 5	40	104
35 5	95 9	38	100 4	40 5	104 9
36	96 8	38 5	101 3	41	105 8
36 5	97 7	39	102 2	42	107 6
37	98 6	39 5	103 1	43	109 4

METRIC SYSTEM

Weigl t	1 000 micrograms (γ)	1 milligram (mg)
	1 000 milligrams (mg)	1 gr m (Gm)
	1 000 g ams (Gm)	1 kilogram (Kg)
Volum	1 000 cubic millimeters	1 milliliter (ml) or 1 cubic centimeter (c)
	1 000 ubic ntim t r (cc)	1 lit r (L)

IDEAL WEIGHT FOR ADULTS AGES OF 25 AND OVER

(Cou t f th M t politan Lif I an C mp y)

H igh (With Shoe)			I1 I W igh in Pound nd Kil g m f MEN (F w ight wi hout hoe lothing, b t 5 8 pou d)					
			Sm ll F m		M d m Fr m		L g Fr me	
F	I	Cm	lb	Kg	lb	Kg	lb	Kg
5	2	157 5	116 125	5 6 56 7	124 133	56 3 60 3	131 142	59 4 4 4
5	3	160 0	119 128	54 0 58 1	127 136	57 61 7	133 144	60 3 65 3
5	4	162 6	12 132	55 3 59 9	130 140	58 9 63 5	137 149	62 1 67 6
5	5	165 1	126 136	57.1 61 7	134 144	60 8 65 3	141 153	63 9 69 4
5	6	167 6	129 13	58 5 63 1	137 147	62 2 6 7	145 157	65 8 71 2
5	7	170 2	133 143	60 3 64 9	141 151	64 0 68 5	149 16	67 6 73.5
5	8	172 7	136 147	61 7 66 7	145 156	65 8 70 8	153 166	69 4 75 3
5	9	175 3	140 151	63 5 68 5	149 1 0	67 6 72 6	157 1 0	71.2 77 1
5	10	177 8	144 155	65 3 70 3	153 164	69 4 74 4	161 175	73 0 79 4
5	11	18 3	148 158	67 1 72 1	157 168	71 2 76 2	165 180	74 8 81.7
6	0	182 9	152 164	69 0 74 4	161 173	73 0 78 5	163 185	76 7 83 9
6	1	185.4	157 169	71 2 76 7	166 178	75 3 80 7	174 190	78 9 86 2
6	2	188 0	163 175	73 9 79 4	171 184	77 6 83 5	179 19	81 2 88 9
6	3	190 5	168 180	76 2 81 7	176 189	79 8 85 7	184 202	83 5 91 6

H g t (With Shoe)			Id l W gh in Pou d and Kil g am f WOMEN (F w ight wi ho t hoe or l thing bt t 2 3 p d)					
			Sm ll F m		M d m F m		L g F m	
F	I	Cm	lb	kg	lb	Kg	lb	kg
5	0	1 2 4	10 111	47 6 51 3	112 12	0 8 54 4	119 129	54 0 8 5
5	1	154 9	107 115	48 5 52 2	114 122	51 7 5 3	121 131	54 9 59 4
5	2	157 5	110 118	49 9 53 5	117 125	3 1 56 7	124 135	56 3 61 2
5	3	160.0	113 121	51.3 54.9	1.0 128	54.4 58.1	1 7 138	57.8 6 .8
5	4	162 6	116 125	52 6 56 7	124 132	56 3 59 9	131 142	59 4 64 4
5	5	165 1	119 128	54 0 58 1	127 135	57 6 61 2	133 145	60 3 65 8
5	6	167 6	123 132	55 8 59 9	130 140	8 8 63 5	138 150	62 6 68 0
5	7	170.2	126 135	57 2 61 7	134 144	60 8 65 3	142 154	64 4 69.9
5	8	172 7	12 139	58 5 63 1	137 147	62 2 66 7	145 158	65 8 71 7
5		175 3	133 143	6 .3 4.9	141 151	64 0 68 5	149 162	67 5 73.5
5	10	77 8	136 147	61 7 66 7	145 155	65 8 70 3	152 1	69 0 75 3
5	11	180 3	139 150	63 1 68 0	148 158	67 1 71 7	155 189	70 3 76 7
6	0	182 9	141 153	64 0 69 4	151 163	68 5 73 9	160 174	72 6 78 9

F g 18 t 25 pp m id l w igh an be l l d by bt ctl g l 0 lb (0 5 Kg) f h y ar of g l han 25 y

AVERAGE HEIGHT AND WEIGHT FOR CHILDREN

Ag Y	BOYS H igt			W igh		GIRLS H gFt			W gF	
	F	I	m	Lb	Kg	F	I	Cm	Lb	Kg
Bir	1	8	45 7	7½	3 4	1	8	50 8	7½	3 4
1/2	2	2	66 0	17	7 7	2	2	66 0	16	7 2
1	2	5	73 6	21	9 5	2	5	73 6	20	9 1
2	2	9	83 8	26	11 8	2	8	83 8	25	11.3
3	3	0	91 4	3	14 0	3	0	91 4	30	13 6
4	3	3	9 .0	34	15.4	3	3	99.	33	5.0
5	3	6	106 6	39	17 7	3	5	104 1	38	17 2
6	3	9	114 2	46	20 9	3	8	111 7	45	2 4
7	3	11	119 3	5	23 1	3	11	11 3	4	22 2
8	4	2	127 0	57	25 9	4	2	127 0	58	25 4
	4	4	132 0	63	28 6	4	4	132 0	63	8 1
1	4	6	13 .1	6	31.3	4	6	137 1	6	21 3
11	4	8	142 2	77	34 9	4	8	14 2	77	34 9
12	4	10	147 3	83	37 7	4	10	147 3	86	39 0
13	5	0	152 4	9	4 7	5	0	152 4	98	5
1	5	3	15 3	107	48 5	5	2	157 5	107	48 5
5	5	4	162 6	116	52 6	5	3	160 0	1 5	
16	5	6	167 6	128	58 0	5	4	162 6	118	53 5
17+	5	7	170.2	134	6 .8	5	4	162.6	119	53.5

W ight g 15 and 17 xtrem ly tab

EMERGENCY DRUGS

Drug	P p tions and Do ges	A tion	I di tion	Contr i di tion and Ca tions
Amob bit l Sodium N F (Amyt l Sod um®)	0 25 0 50 Gm powd in c p sul s m k up as f sh 10% Sol Give slowly I V I M 0 13 Gm (2 gr) rectal upp it i s	Hyp oti s dative antic vul ant	Co vulsions tat s epil pticus (f m t hy t la, mani re t on to loc l are th ti	B bit t s nsiti ity deli ium r pirat ry distr s (tr i) he p ti in uffi i n y (give apid ti g b bit at) r l i ffi i ncy (give l w ti g b bit r t)
Par ld hyd U S P B P	Or lly 4 16 c (1 4 d) i d Enema 8 20 (2 5 dr) with 2 3 lum of veg t bl o min al o l I M 4 10 cc (1 2½ dr) I V 1 3 cc diluted with t ip) v l m of ph i l gic l lin	Hyp ic s d tive ti onvulsant	Convul ion t t p l p xcit me t hy t ri mani re tion to loc l an th ti m y l be s d in t tm t of d li i m	R p tory di (p lmon y) h p ti t uffi i y gastro- i itis (al o te)
M rphine Sulf t U S P B P	8 32 mg (⅛ ½ gr) ub t I M I V (For th latt r ee line s lution)	N c ti (an lg i s d hyp otic)	S ve p in d t m li pl us s pulmon y ed m ver di the	H d injury m phi ti y bronchi l asthm undiagn d s rgi al bdomin l di se hep ti i ffi i y, hypothyr idi m
At opin S lf t U S P B P	0 3 0 6 mg (1/4 0 1/100 gr) lly r bcutaneously	Par ymp th ti dep s a t C N S stim lant	C l hy p n m h lyl poi oning m rphin poisoning m h oom poisoning rotid l s yn ope Stok Ad ms yn ope	Gl to drug n ti ty
Epin phrin U S P Ad line B P	0 1 0 5 (2 8 m) of 1 1 000 l tion bcut I M I V	Symp th m m t	V l land till b on h l thm angioneuroti dem hock (?)	Ad an d hype t ive va l r dis dvan d cerebral rt io- s l osis rious rganic he rt di during g l an th ia
Aminophyllin U S P Th ophyllin with Ethylenedi mine B P	0 25 0 50 Gm (3 3/4 7½ g) 2 5% lution slowly I V I M or 0 50 Gm t l pp itory	B on hi l d l t myoca di l tim l t ona y odilat (?) diu tic	P lmon y d m b on h al thma Ch yn Stok s pir tion myoc di l inf tion (?) t t gin s (?)	

(on U S P (ed in d)	(1 2 g) I M I V r ll = 4 by 2 (0 4 mg.) I M or I V very 3 5 hou unt l ffer ed	myoc dium d as A V con d ion	A ong 1 fl f b ll on h p r g 1 p y m l d	R l ly on ind d l myoc d myoc di l 1 m t i l y di d bl k unl f il oc
P pica U S P B P	0 3% solution (3 g / once had pe t ve y 15 6 m m ml t m	C N S u lan	B rt poisoning	M rphine poi oni g
N N R (M I P B P	5 10 mg (1/12 1/6 gr) pe I 15 m and the 1 2 h w mo gl d 40 mg	s m p ry f	Opi (m phi) m pe idi (pethi ine) d m thad poi oni g ove dos ge	N i ll gain i hypno l nd dati e (barbiturat parald hyd hl ral hydrat e)
U S P B P	4 10 (1 2) lution I V	C N d p nt suppli s Ca ion	Hyp al mi any (due t ne ph ti hypop r thyroidism thal i hype ve tilation) in t pe i s pid bite poi in g	
I S P B P	0 5 0 (8 16) (tion I V	C N S t uppli s Mg	T y pil on ul m nvul ion	N give nl y g f 10% 1 (m gl on handy
Test or B P	m 10 20 (2 2 d) I V	De yd g ag nt sup gl	Syr m d ry re d tol s ani l pr ur (u br l d m l hyp gl) mia d to l lin hype vol m	
Hy Ls (L P 1	1 0 mg (1) 10 I V R pe t d dos p e	H pl t	Ad cort l in uff i y Addi nian ri is W t h P it i ha hock ( )	
ject (LAL) U S P B P	I and d y I (m) m q 4 H d y d ighi d day I (m) (m q 4 H d d t y m I (n) lon b (4, for 10 d y nt l ompl very		A y d g id p i oni g timony bi m h hr mi myg d ni k l poi on ing (?)	Lead p i on g
(l l	(2) pow d w oi t part I (ri mag y i m d) I ((w ping) la w rm w r nd pe t h y			